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ENVIRONMENTAL QUALITY PROFILE
1972 - 1976
WINNEBAGO COUNTY, ILLINOIS

Document No. 78/26

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ENVIRONMENTAL QUALITY PROFILE

1972 - 1976

WINNEBAGO COUNTY, ILLINOIS

by

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INTRODUCTION

Since Earth Day on April 22, 1970, there has been considerable coverage in the news media concerning the quality of the environment. But most of that coverage deals with national impacts while local environmental issues largely go unreported. This Environmental Quality Profile is an attempt to communicate to the citizens of Winnebago County the state of their environment.

This Profile is a unique undertaking. It is designed to inform residents, taxpayers, and government officials in a comprehensive way of the Environmental Quality of our locale. The profile covers twelve areas of concern: Air Quality, Energy Conservation, Forest and Prairie, Living Space, Mineral Resources, Noise Quality, Radiation, Soil Conservation, Solid Waste, Water Quality, Water Resources, and Wildlife.

It covers the years 1972 through 1976 to determine any discernible changes in Environmental Quality.

Primary support for the profile comes from the Illinois Institute of Environmental Quality. We also acknowledge assistance from the Rockford Park District, Winnebago County Forest Preserve District, City/County Planning Commission, Winnebago County Soil and Water Conservation District, Northern Illinois Gas, Commonwealth Edison, the Winnebago Farm Bureau, Illinois Department of Conservation, Illinois Environmental Protection Agency, Illinois Department of Health, Illinois Division of Energy, Illinois Bureau of the Budget, University of Illinois Agricultural Extension Service, Illinois Nature Preserve Commission, Illinois State Geological Survey, Illinois Water Survey,

United States Soil Conservation Service, and United States Agricultural Stabilization and Conservation Service.

Special recognition goes to Jon McGinty for all the original photography for the project. Nadine Reid was responsible for overall layout and design of the Environmental Quality Profiles.

SUMMARY

The following sections are keyed into the Summary Environmental Quality Profile, Table 1, following the section.

Air Quality

Average concentrations of sulfur dioxide in the air declined between 1972 and 1976. There were only four years of data for nitrogen dioxide so a trend cannot be calculated. The particulate matter levels varied too much to give a valid trend. The 1976 annual average was 15% lower than 1972, but it also had its highest number of health standard violations in 1976. Photochemical oxidents (ozone) is the most serious air quality problem, with 52 days of Primary - Public health violations in 1975 and 1976. With only two years data there is not enough information to indicate a trend.

Energy Conservation

The lack of data for 64% of the energy sources of the county allows only a narrow consideration of this component. However, there was a decrease in natural gas use per customer, indicating that residents practiced conservation. Electrical use in 1976 was the same as in 1973, indicating restraint by users.

Forest and Prairie

A misguided tax system and urban development in rural areas resulted in a loss of 15% of forest acreage from 1960 to 1974, with an apparently quickening pace through 1976. Rare and endangered plants suffered greatly from this loss of habitat. Urban trees and the landscape suffered during the period especially during the dry years of 1975

and 1976. Better fertilization and general tree care could have minimized this damage. Unfortunately, tree replanting seemed to be declining precisely when it should be rising to make up for the increased number of dead trees.

Living Space

There was a leveling off and slight decline (1.1%) in county population. However, all the decline was in the City of Rockford. Population increased in the rural portions of the county, with the northeast quadrant having 45% of all new residential activity. There was a loss of more than 15,800 acres of agricultural land in 1969-74 to urban uses. There is a current shortage of 1,737 acres of park and open space land in the county and a projected need for an additional 2,325 acres to counterbalance future urban sprawl. While the Forest Preserve District and the Rockford Park District have made efforts to catch up on current need, the level of commitment by them and other open space agencies in the county to preserve land lags far behind the need.

Mineral Resources

Although its status appears satisfactory, because usage is highly cyclical, it did not have a statistically valid trend.

Noise Quality

Control efforts by the federal government and the Illinois Environmental Protection Agencies are still in their infancy and noise quality continues to decline for three of the largest noise sources - ground transportation, aircraft and airports, and construction. Only industrial noise has begun to improve.

Radiation

Current non-natural radiation levels are low and well within safety margins. Global fall-out exposure has declined, but there are no agreements by the Chinese and French to limit their open air testing. There was no nuclear power generated locally during the study period. Shipment of used radioactive fuel through the county is an area of concern.

Soil Conservation

Construction sites contribute 50% of particulate matter air pollution due to wind erosion of bare soil. Agricultural soil loss due to water erosion is polluting streams and is higher than that which will sustain perpetual agriculture. The trend appears to be worsening, and the Soil and Water Conservation District continues to fight a losing battle.

Solid Waste

With very limited data, it appears that per capita waste may have stabilized. It is too soon to say for sure. Until 1972 the per capita quantity increased yearly.

Water Quality

The average Water Quality Index values for all stream monitoring stations improved from 1972 to 1976 and significantly fewer and less harmful fish kills indicate improvements in rivers and streams. Some specific pollutant violations remain to be rectified. Drinking water quality remained unchanged at a high level of quality over the period.

Water Resources

Although there is no valid trend, it appears that water consumption

per capita may have leveled off from 1972 to 1976, a change from the historical pattern of annual per capita increases. State figures indicate that the county is using 50% of the available groundwater resulting in its satisfactory status.

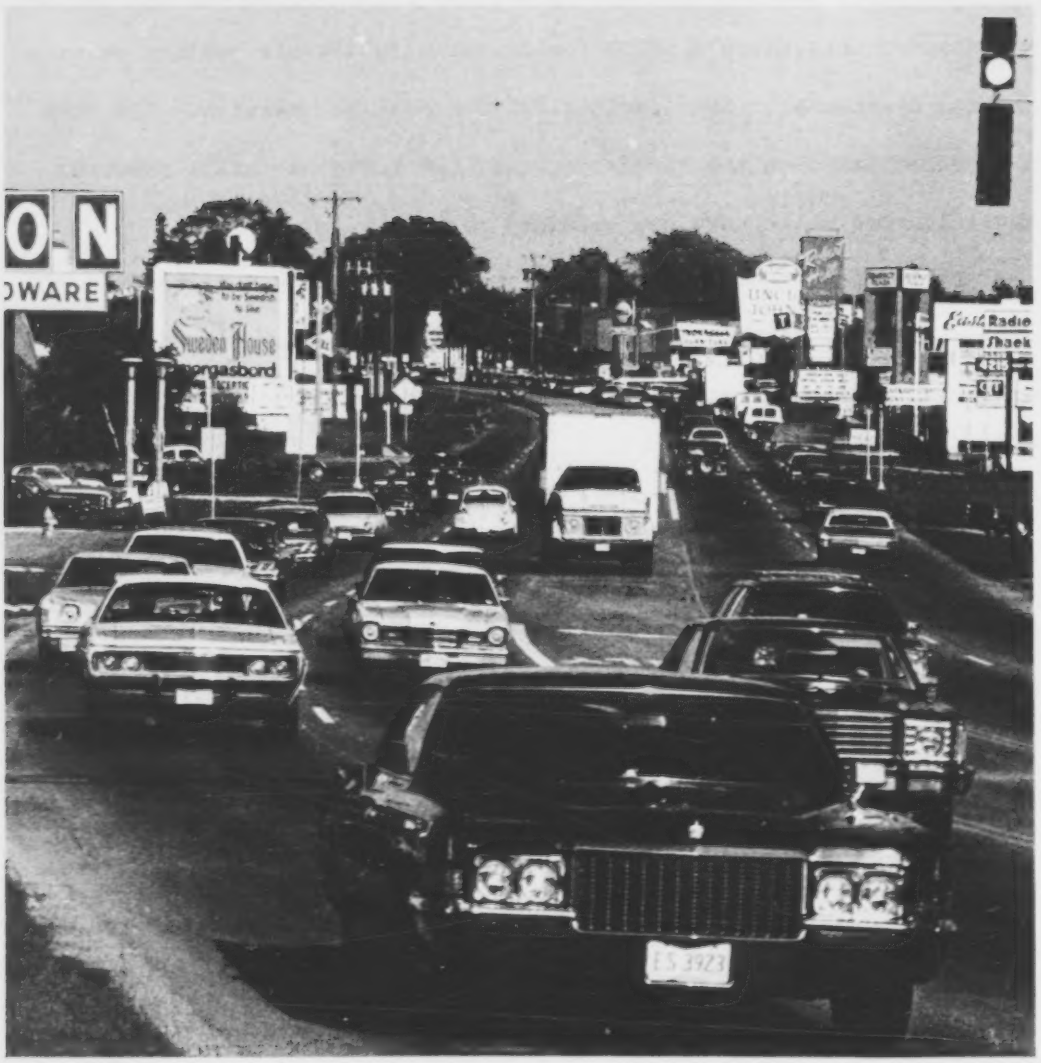
Wildlife

The loss of land to urban development and more intensive agricultural practices has eliminated habitat for both game and rare and endangered animals, and caused a declining trend during the period. Wood ducks and bluebirds have been helped by the installation of artificial houses. Fish populations have benefited significantly from improved water quality. There seems to be an increased disregard of state wildlife regulations and enforcement has suffered from decreased staffing levels.

TABLE 1

ENVIRONMENTAL QUALITY PROFILE SUMMARY (REPRESENTATIVE INDICATORS)

COMPONENT	INDICATORS	STATUS	TREND
AIR QUALITY	SULPHUR DIOXIDE	SATISFACTORY	IMPROVING
	PHOTOCHEMICAL OXIDANT (OZONE)	AREA OF CONCERN MORE ACTION NEEDED	INSUFFICIENT DATA
ENERGY CONSERVATION	CONSERVATION OF NATURAL GAS	SERIOUS PROBLEM	IMPROVING
FOREST & PRAIRIE	DECLINE IN ACREAGE IN FORESTS	SERIOUS PROBLEM	WORSENING
LIVING SPACE	COUNTY DEVELOPMENT - PATTERNS OF LAND USE	SERIOUS PROBLEM	WORSENING
MINERAL RESOURCES	SAND, GRAVEL AND LIMESTONE MINING AND USE	SATISFACTORY	NO VALID TREND
NOISE QUALITY	EXPOSURE FROM GROUND OR AIR TRANSPORTATION	SERIOUS PROBLEM	WORSENING
RADIATION	EXPOSURE FROM NATURAL SOURCES AND NUCLEAR POWER	SATISFACTORY	UNCHANGED
SOIL CONSERVATION	LOSS OF SOIL	SERIOUS PROBLEM	WORSENING
SOLID WASTE	QUANTITY AND RECYCLING	SERIOUS PROBLEM	INSUFFICIENT DATA
WATER QUALITY	STREAM WATER QUALITY	AREA OF CONCERN MORE ACTION NEEDED	SLIGHTLY IMPROVING
	DRINKING WATER QUALITY	SATISFACTORY	UNCHANGED
WATER RESOURCES	USE AND QUANTITY AVAILABLE	SATISFACTORY	NO VALID TREND
WILDLIFE	POPULATIONS OF WOODCOCK, PHEASANT, PARTRIDGE, GREY AND FOX SQUIRREL AND COTTONTAIL RABBIT	AREA OF CONCERN MORE ACTION NEEDED	SLIGHTLY WORSENING
	POPULATIONS OF WOOD DUCK AND FISH	AREA OF CONCERN MORE ACTION NEEDED	IMPROVING



AIR QUALITY

Because air sustains life, its purity is one of the most important components of Environmental Quality in Winnebago County. This section examines the major air pollutants, the sources of these pollutants, and trends from 1972 to 1976.

The Illinois Environmental Protection Agency (IEPA) requires all stationary sources of air pollutants to control their emissions so that the sum of all emissions for the region will still allow the general air

quality to be equal to or better than federal and state standards. In Winnebago County there are 317 facilities with 490 air quality permits granted by the EPA. Some facilities have multiple permits. The IEPA has concentrated on the larger sources, but there are still numerous small sources which have not obtained permits.

Illinois has general air quality standards for six components of air pollution: particulate matter, sulfur dioxide, hydrocarbons, carbon monoxide, photochemical oxidants (ozone), and nitrogen dioxide. The IEPA and the United States Environmental Protection Agency (USEPA) are currently monitoring for other air pollutants, but standards have not yet been set. Chromium, copper, iron, lead, and nickel are also part of the air. These heavy metals, as well as sulfates and nitrates, enter the water from the air.

The following paragraphs examine the effects, sources, and quantities of material going into the air.

Particulate matter is small, solid particles or liquid droplets suspended in the air. While it includes particles as large as the width of a human hair, the ones only 1% that size cause the most health problems. These small particles get into the lungs and the bloodstream. In high concentrations, they increase bronchitis, may cause cancer or heart attacks, and shorten life expectancy. Unfortunately, these small particles are the hardest to remove technologically and rainfall is still the major "air cleaner."

The total amount of particulate matter entering the county's air is around 37,400 tons per year, or about 100 tons every day. There are numerous sources of particulate matter, but 80% of that in Winnebago County comes from "fugitive emissions" - predominantly topsoil picked up

by winds. Construction sites produce half the windborne particulate matter pollution. Dirt roads are the second largest source, producing 18%. The third largest comes from combustion of fossil fuels (7%), with two-thirds of this from industrial or commercial facilities.

The second major pollutant is sulfur dioxide. Once in the air, sulfur dioxide can turn into sulfuric acid and other sulfates, which are estimated to comprise 5-20% of the total particulate matter in the air. This acid rainfall can damage plants, including such agricultural crops as soybeans; vehicles and house paint; other materials subject to corrosion. Sulfur dioxide also appears to increase the effects of particulate matter on the lungs and heart. Nearly 10 tons per day of sulfur dioxide were emitted in 1975. Eighty percent of the sulfur dioxide comes from consumption of fuel in homes, offices, stores, and industries in the county, with approximately two-thirds of that total from industry.

Nitrogen dioxides are the third regulated pollutant. Only recently have monitoring methods been developed to measure the concentrations of nitrogen dioxides and less information on their quantities and effects is available than for other pollutants. Along with sulfates they contribute to the haze over cities and towns in the summertime, and at high concentrations cause lung inflammation. At levels 25% over the standard, they cause respiratory disease. In combination with hydrocarbons, they react with sunlight to create a third pollutant: photochemical oxidants (ozone). There are an estimated 12,300 tons of nitrogen dioxide, formed by the intense heat of modern engines and large boilers emitted into the air in Winnebago County each year. That's 34 tons daily. Eighty percent of nitrogen dioxide comes from vehicles, the primary sources being automobiles and lightweight gasoline powered

trucks. A secondary source is heavy duty gasoline powered trucks.

The fourth regulated pollutant is photochemical oxidants (ozone). Ozone injures plants, including agricultural crops, reducing crop yield or killing the plant, depending on its concentration in the air. There is increasing concern that ozone may be a major health hazard. It causes asthma attacks, eye irritation, and reduced performance in athletes. Photochemical oxidants are created by a reaction of nitrogen dioxides in the presence of hydrocarbons and sunlight. The quantity of photochemical oxidants formed over the county or carried in by the winds is unknown.

The fifth pollutant, hydrocarbons, does not appear to have an effect on health independently, but is regulated because of its role in forming photochemical oxidants (ozone), which do affect health. The amount of hydrocarbons emitted into the air in Winnebago County in 1975 was about 28,600 tons per year or 80 tons per day. Sixty percent came from a wide variety of evaporative solvents, including paint, which are used in households and business. One-third of hydrocarbon emissions are from incomplete combustion of gasoline. Other sources are natural vegetation, enamel coatings in metal finishing, varnish in furniture making, charcoal lighting fluid, plastics in automobile parts, including seats, and gasoline fumes from vehicle fuel tanks.

The sixth pollutant is carbon monoxide, the same deadly gas emitted from a vehicle left running in a closed garage. Fatal concentrations do not occur in open air, but even in the much lower concentrations allowed by the air quality standards can affect time-interval judgment or aggravate heart and lung disease. Based on quantity, carbon monoxide is the largest pollutant in Winnebago County. About

71,000 tons per year or about 200 tons per day are produced. Ninety-four percent of carbon monoxide is produced by incomplete combustion of gasoline.

The federal government sets air quality standards for emissions of nitrogen dioxides, hydrocarbons, and carbon monoxide from motor vehicles. In Winnebago County motor vehicles produce 94% of the carbon monoxides, 80% of the nitrogen dioxides, and 33% of the hydrocarbons.

The Illinois Pollution Control Board has adopted regulations for general air quality equal to the federal government's. The standards are set at two levels - secondary standards are designed to protect the public welfare from soiling, corrosion, and vegetation damage caused by air pollutants; the higher primary standards protect the public health by preventing disease, or interference with normal body function due to air pollution.

For people with lung and heart problems, the county's peak ozone level for the previous day is reported in the summertime in the Rockford newspapers, radio, and TV media, along with a prediction for the peak current day's level. If an episode occurs, then hourly samples are taken and reported to IEPA.

Winnebago County has some pluses and minuses in regard to air quality. On the plus side our prevailing winds from the west do not bring in much pollution, though there are 2 months when Milwaukee is up wind and 5 months when the Quad Cities and Peoria are up wind. On the minus side, the Rock River Valley tends to contain air pollution during times of slow moving air. The county residents also benefit two other ways. First the economic base of the county is not based on heavy industry. Second, local industry by and large has worked cooperatively

with the State to clean up their emissions though there has been foot dragging by a minority of companies.

The accompanying Air Quality Profile for 1972-76, Table 2, shows the status and trends of the six major pollutants. The status section indicates if the pollutant exceeded the lower secondary - public welfare standard, or the higher primary - public health standard; and if it did, the number of days of violation each year. An annual and five year total of violations is also included. There were no hydrocarbon or carbon monoxide monitors in Rockford during the study period, but one for carbon monoxide has been proposed. A photochemical oxidant (ozone) monitor was in operation since 1975. Photochemical oxidants (ozone) was the biggest air pollution problem in Winnebago County. Although it was monitored for only two of the five years, it had sixteen times more public health and welfare standard violations than did particulates during the entire five years. While the photochemical oxidants (ozone) level resulted in fewer violations in 1976 than in 1975, a minimum of four years of data is necessary to calculate whether there is a real downward trend.

Particulate matter is Winnebago County's second worst air pollutant. Between 1972 and 1975, the average annual concentrations were decreasing, but in 1976, there were five secondary-public welfare standard violations and the county's first measured primary-public health standard violation. Analysis of the data did not indicate any trend. The relatively dry summer was partly responsible in 1976. In the fall, a major fugitive dust situation occurred, and thirty percent of all monitoring sites in Illinois exceeded the primary-public health standard on one day.

Sulfur dioxide is an air quality success story for Winnebago County and the state as a whole. Statewide, the average annual levels of sulfur dioxide during the past ten years have decreased by 70%. Ten percent of the reduction occurred during the past five years. In order to determine if major changes took place, the data was subjected to statistical analysis to determine if the changes were random or displayed a consistent pattern. Winnebago County had a downward trend of annual averages for the 1972-76 period. The concentration in 1976 was 66% lower than in 1972.

Nitrogen dioxides had no primary or secondary standard violations between 1973 and 1976. Unlike that of other pollutants, the standard is solely based on an annual average. The other standards, because of their health impacts, have shorter time periods of one, three, eight, or twenty-four hours. There was not a trend for the annual average of nitrogen dioxides during the period.

TABLE 2

AIR QUALITY PROFILE

POLLUTANTS	STATUS					TOTAL	TREND
	1972	1973	1974	1975	1976	1972-1976	
PARTICULATE MATTER	0	0	0	0	3	3	NO VALID TREND
SULPHUR DIOXIDE	0	0	0	0	0	0	IMPROVING
NITROGEN DIOXIDE	NO DATA	0	0	0	0	0	NO VALID TREND
PHOTOCHEMICAL OXIDANTS (OZONE)	NO DATA	NO DATA	NO DATA	34	18	52	INSUFFICIENT DATA
TOTAL VIOLATIONS PER YEAR	0	0	0	34	21	55	

KEY:

VIOLATION OF PRIMARY - PUBLIC HEALTH STANDARD

VIOLATION OF SECONDARY - PUBLIC WELFARE STANDARD

X — NUMBER OF DAYS THAT THE STANDARD WAS VIOLATED

ENERGY CONSERVATION

Other than a small amount of local wood being burned in homes, the primary sources of energy are from outside Winnebago County. There is little specific information on energy use in Winnebago County. In Illinois, 29% of the energy used comes from natural gas, 20% from coal, 16% gasoline, 12% electricity and nuclear fuel, and 11% distillate and residual oil. In Winnebago County, the percentage of energy from coal is much less because Commonwealth Edison is rapidly expanding its use of nuclear power.

In Illinois, electric utilities are the final consumer of 20% of the energy (which is waste heat from producing electricity that is consumed by other sectors), transportation 23%, industry 22%, residential 19%, commercial 14% and agriculture 1%. These figures are probably similar in Winnebago County.

There is much inefficient use of energy. Only 51% of all energy is utilized for useful work, while 49% is wasted, usually as unused heat.

The statewide figures on distillate fuel utilized in oil burners in homes and industry show a downward trend between 1972 and 1975. Preliminary estimates showed a slight increase in fuel oil use for 1976, but considering the cold winter, this indicates conservation by homeowners and industry.

However, in Illinois, even with the oil embargo and increases in energy costs, gasoline usage declined only in 1974. Record amounts were used in 1975 and 1976. There has been a continual increase in the amount of imported oil during the 1970's. The United States is now importing more oil from the Arab countries than before the boycott. On one day in 1976 for the first time the nation imported more petroleum for one day's use than it produced. Consequently, petroleum products in the Energy Conservation Profile, Table 3, are categorized with a serious problem status, but insufficient data for a county trend.

The total electricity used each year, divided by the number of customers, was examined. Commonwealth Edison showed an increase between 1972-73, but there was a drop between 1974 and 1975. Not until 1976 did it reach the same level as in 1973. In 1976 improved electric heat pumps came on the market which are more energy efficient at heating and cooling, and their sales got off to a fast start. Due to its reliance on fossil fuels and nuclear power and its magnitude, electricity's status on Table 3 is serious, but the usage varied too much to show a consistent trend.

Natural gas is used much more for space heating than electricity. Consequently, gas usage can be related to how cold the year was.

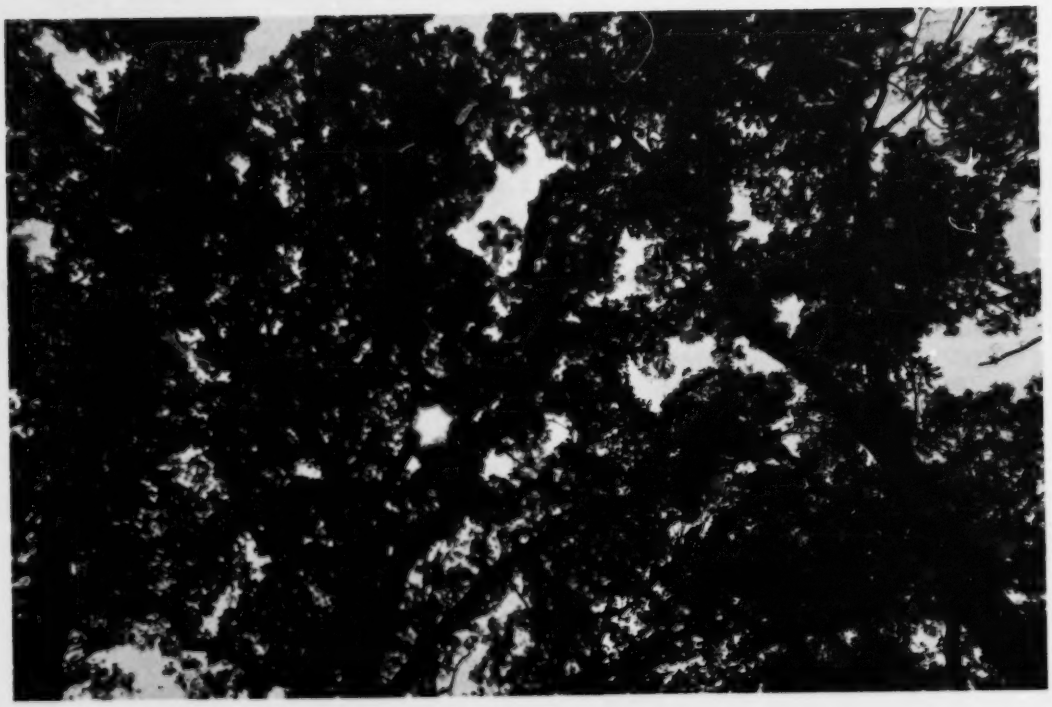
Analysis for the years 1973-76 shows a downward trend for natural gas usage per customer per degree day. Both industrial and domestic users of natural gas in Winnebago County appear to be using conservation and insulation and turning down their thermostats. The non-renewability of natural gas determines its serious status on Table 3, while the decreased usage gives it its improving trend.

Solar energy applications are increasing within Winnebago County with three solar units installed in 1976 and several more proposed. As solar energy is a renewable and non-polluting source of energy, its status in the Energy Conservation Profile, Table 3, is an area of concern with an improving trend due to the increased installations and interest.

TABLE 3

ENERGY CONSERVATION PROFILE

	STATUS	TREND
PETROLEUM PRODUCTS	SERIOUS PROBLEM	NO DATA
ELECTRICITY	AREA OF CONCERN MORE ACTION NEEDED	NO VALID TREND
NATURAL GAS	SERIOUS PROBLEM	IMPROVING
SOLAR	AREA OF CONCERN MORE ACTION NEEDED	IMPROVING
COAL	AREA OF CONCERN MORE ACTION NEEDED	NO DATA



FOREST AND PRAIRIE

This section will look at the benefits, status, and trends of forest and prairie in both urban and rural areas and the endangered plants in the county.

One-third of the United States is forested. Eleven percent of Illinois contains forest, but only three percent of Winnebago County. Illinois is fifth in use of lumber, but 34th of all the states in production. Consequently, both Illinois and Winnebago County are large importers of wood products.

Trees as reproducing, growing organisms, are renewable resources. Therefore, national and county policy should be aimed at managing our forests in perpetuity. However, national statistics show the total cutting of trees is greater than their growth. But the forests in the eastern part of the United States, including Winnebago County, are producing more hardwood and softwood than is cut.

Because of the many uses of wood and the expected national population increase, demand for forest products is projected to increase 133% by 2020. This demand is greater than the expected supply. Unlike agriculture, crops, or livestock with 1-5 year life cycles, trees require a longer time to mature. In Winnebago County it takes 50-80 years for an oak tree on a good site without disease or fire damage to grow to sufficient size for use as lumber.

In Winnebago County there have been major changes in forest cover since settlement. Based on research of original land survey records from the 1830's, one-fourth of the county was covered by forests. In 1974, it was 3% or one-eighth the original amount. Prairie which covered three-fourths of the county in 1830 is now rare at well less than 1%. Most has been converted to farmland.

Looking at the Forest and Prairie Profile, Table 4, the loss of acreage is a serious problem. From 1958 to 1967, the county lost 30% of its timber land - more than 6,900 acres. During 1969-74, an additional 1,900 acres or 15% was lost, and more has been lost since 1974 due to urbanization. While timber products are not as economically important to the county as agriculture, (in 1974 they contributed $52,000 to the economy of the county and have a much higher potential), forests are extremely important for wildlife and preventing erosion and flooding.

Under "current situation" of Table 4 several factors are examined. Seventy-four percent of the rural timberland in Winnebago County is grazed by livestock. This significantly damages forests because livestock compacts the soil, increasing water runoff, and browse on small trees which retards growth or kills the tree. The situation is improving because of a combination of factors. The most important is that

there are significantly fewer animals on agricultural land. Fewer animals mean less grazing. The University of Illinois Agriculture Extension Agent, State Foresters, and the Soil Conservationist are unanimous in recommending that farmers stop grazing their woods. It remains to be seen whether animal populations increase again, or the problem returns.

Fifty-four percent of the rural forests are too thin or inadequately stocked with trees and need establishment and reinforcement plantings as shown on Table 4. Twenty-six percent of the forests have poor quality trees which are crooked, defective, leaning, etc., and need timber stand improvement. This activity includes management practices designed to improve the vigor, stocking, composition, productivity, and quality of the forest. The trend for both the thin and poor quality forests is slightly up because the grazing has decreased and they are slowly recovering.

The largest and best forests, 20% of the woods in the county today are only 80-120 years old and are classified as satisfactory in the profile, Table 4, meaning they have healthy trees, adequately stocked with a good mixture of sizes and types. Many of the forests were overcut or cleared of all their marketable trees rather than by a selective process that removed only mature trees and allowed the forest to perpetually produce. Consequently, the average size of the trees is quite small and most of them can only be used for less valuable products. Since trees are renewable, they are growing back so this trend is slightly improved.

In terms of needed actions, 87% of the forests in Winnebago County require increased management; 5% insect and disease control; and 6%

further protection from fire. More action is needed though the trend is slightly improving.

Property taxes were a serious problem for forest land for years 1972-76 as shown in the profile, Table 4. There is a higher financial return for the farmer growing an annual crop than for the forest land owner who must wait 40-80 years before trees reach marketable size. Therefore, the owner of forest land is at a distinct disadvantage when paying annual property taxes. These annual taxes have caused much of the overcutting of the forests in Winnebago County because of the pressure of paying taxes. The trend has worsened over the period due to the tax increases.

Ironically, while local governments are taxing rural forest land out of existence, the federal and state governments, recognizing the expected severe wood shortage in 45 years, are providing assistance to forest land owners to help them manage their woods in a perpetual fashion. Probably most important is the provision of a State Forester by the Department of Conservation. His job is to help forest land owners improve their woodlands by evaluating the forest, preparing a forest management plan, selecting the trees to cut, recommending how the trees should be sold, and providing other necessary information. In addition, the Department of Conservation operates two tree nurseries which furnish young trees at cost to rural land owners.

The Soil and Water Conservation District also includes forest considerations in its soil erosion plans. This is because some areas of the county are so steep, rocky, or wet that growing trees on them is the best use of the land and prevents soil loss.

The Agricultural Stabilization and Conservation Service of the

Department of Agriculture provides cost-sharing funds to land owners to help them improve their forests and plant new trees. Unfortunately, there has been a decreasing demand for the funds since 1972 with no funds used for this purpose in 1976.

There is a wide range of direct and indirect benefits to forest conservation in Winnebago County. The owner benefits because timber is a renewable income-producing resource from land that is generally unsuitable for other uses because of its steepness, poor soils, or flood hazards. It is advantageous to farmers. Because the average hardwood woodlot in Illinois is 40 acres, to be maintained perpetually it needs to be selectively cut only about every 15 years, and much of the annual maintenance of the forest can be done in winter when other farm time demands are less. Citizens of the county as a whole benefit in several ways too. The conservation of forests in the county reduces soil loss by maintaining adequate soil cover. The forests are oxygen machines which remove carbon dioxide that people, animals and machines give off and return pure oxygen. There are local sources of firewood which is used increasingly to heat homes. There are local sources of Christmas trees to provide families with a recreational experience of picking and cutting their own. For hunters and others interested in wildlife, the woods provide food and shelter. All year round the forests add visual diversity to the agriculturally dominated landscape. In the fall their colors add brilliance to the scenery. If all the social values of the forest could be valued economically, they would probably far exceed their commercial value if cut.

Trees and shrubs have an important role in urban as well as rural areas. The last 25 years have been poor for urban trees due to Dutch

Elm disease. In Rockford especially, American Elms were planted widely because of their beautiful stately canopy. As they matured, Rockford acquired the nickname "the Forest City." But after Dutch Elm disease came from Europe in the 1950's, 98% of the elms on public land in Rockford were killed. Since then, only 75% of the dead trees on public land have been replaced. Yet much of the blame for the devastation of the urban forest rests with the over-planting of American Elms in the first place. Ecology teaches us that there is more stability in variety and diversity than in uniformity. Urban forests should have a variety of shade trees adapted for urban use so that no disease would so severely impact the trees and the urban landscape.

In urban areas, trees and shrubs have many benefits. They produce oxygen and save energy and money by shading homes from the hot summer sun, while pine and fir trees block the winter winds. Mature trees add economic value to property because people pay more for the beauty of trees. They serve as homes and food sources for birds and squirrels, adding to the overall pleasure of a neighborhood. Lastly, as Rockford unfortunately discovered when it lost its elms, a community's attractiveness is greatly affected by its trees.

The State Forester of the Department of Conservation spends about one-fourth of his time in Winnebago County on urban forestry. The City of Rockford also employs a forester, but his responsibilities mostly include managing trees on city-owned or rights-of-way land. The city forester advises Rockford residents while the state forester provides advice to both Rockford or county residents on the types of trees or shrubs to plant and treatment for diseased trees. Rockford also has an ordinance for the city land along the streets to prevent, for instance,

the planting of trees like the American Elm which is so subject to disease. Also the new soil survey for the county includes urban forestry information. On the basis of the type of soil, they recommend the trees, shrubs, and vines to plant for the best success. Any homeowner can obtain this information from the Soil and Water Conservation District.

From 1970 through 1976, the Rockford Forestry Department planted 1-1/2" diameter trees on terraces (city property between the street and sidewalk) on a request basis, but unfortunately, in declining annual numbers. This is unfortunate for two reasons. First, the city has been cutting the funds for the planting without any city survey of needs. Also, while it seems fair to plant by request, this does not insure that those areas of the city that need trees will get them.

In fall of 1976, Rockford gave away 1,000 free whip trees (less than 3/8" diameter) to citizens to plant as the first benefits of the city's profitable newspaper recycling program.

The major current problem with urban trees in the county is disease. Like people, trees need proper nutrition to stay healthy. They can survive minor diseases, but major ones will kill them if not treated. The best disease prevention is to fertilize the trees to maintain their ability to fight off disease. The city forester no longer recommends planting Sugar Maples because they are dying off from the salt used on the roads and are sensitive to automotive air pollutants. The Forest and Prairie Profile, Table 4, shows the disease and fertilization status of urban forests as an area of concern with more action needed by land-

owners. The disease level of the urban trees is higher than it should be due to lack of fertilization. There was no change in their trend during 1972-76. Because the number of trees is still low since the Dutch Elm disease massacre, the need for tree planting is a serious problem and the trend slightly worsened over the period.

Rare and Endangered Plants

The second area of focus is the plant species associated with forest and prairie which are rare or endangered. While there are 1,000 species of plants in the county, this special group of less than 50 plants helps make Winnebago County a more interesting area. All plants exist in communities with other plants in a specific natural environment.

There are many reasons for preserving rare and endangered plants, including community pride and educational purposes. As indicated in the Profile, Table 4, the situation of endangered species is serious and getting worse. A tremendous amount of prairie already has been destroyed, but more recently timber land which also includes endangered species is being lost rapidly. The amount of land unaffected by people's activities is very small in Winnebago County.

There are several categories of rare plants. First, there is one nationally endangered plant found in Winnebago County -- prairie bush clover. Its numbers throughout the entire county are so low that it has nearly disappeared from the earth. In Winnebago County it is found in only one location on the edge of an active gravel pit. Consequently, its future in Winnebago County is grim.

Another species called forked aster, a member of the daisy family, is one that should be recommended as a nationally endangered plant. It is almost limited to Illinois, and three of its locations are in Winnebago County. Luckily, these sites are being protected.

Second, there is one nationally threatened plant -- the small white lady slipper orchid. It is a prairie plant and found at only one site in Winnebago County.

A recent study discovered that eight plant species may have been lost from Winnebago County since Dr. Egbert Fell of Rockford College did his research twenty years ago. These include one tree, the yellow birch, which is common in Wisconsin and a valuable timber tree; the high bush blueberry; the white fringed orchid; and the purple fringed orchid.

In addition, the county has another 33 species that are very rare in Illinois. Table 5 indicates some of the rare and endangered plants in Winnebago County whose status is critical and whose long term future depends on active preservation. If they are on forest preserve, state or local park land, they will probably be protected, although recreational development may inadvertently destroy them. However, many of the sites are in private ownership and there is no authority to insure protection of the species.

TABLE 4

FOREST AND PRAIRIE PROFILE

	STATUS	TREND
FOREST/RURAL ACREAGE IN FORESTS	SERIOUS PROBLEM	WORSENING
CURRENT SITUATION *		
GRAZING IN WOODS - 74%	AREA OF CONCERN MORE ACTION NEEDED	SLIGHTLY IMPROVING
WOODS TOO THIN - 54%	AREA OF CONCERN MORE ACTION NEEDED	SLIGHTLY IMPROVING
POOR QUALITY TREES - 26%	AREA OF CONCERN MORE ACTION NEEDED	SLIGHTLY IMPROVING
SATISFACTORY OR ADEQUATE FOREST - 20%	SATISFACTORY	SLIGHTLY IMPROVING
FORESTS THAT NEED MORE INTENSE MANAGEMENT - 87%	AREA OF CONCERN MORE ACTION NEEDED	SLIGHTLY IMPROVING
TAXATION IMPACTS	SERIOUS PROBLEM	WORSENING
FOREST/URBAN		
DISEASE	AREA OF CONCERN MORE ACTION NEEDED	UNCHANGED
FERTILIZATION	AREA OF CONCERN MORE ACTION NEEDED	UNCHANGED
TREE PLANTING	SERIOUS PROBLEM	SLIGHTLY WORSENING
FOREST AND PRAIRIE		
RARE AND ENDANGERED PLANTS	SERIOUS PROBLEM	WORSENING

*TOTALS DO NOT EQUAL 100% BECAUSE FORESTS MAY HAVE MULTIPLE PROBLEMS

TABLE 5

TABLE OF RARE PLANTS

PLANTS	SITES IN ILLINOIS	SITES IN WINN. CO.	OWNERSHIP	PRESERVATION POTENTIAL
LEAST GRAPL FERN	1	1	ROCK CUT STATE PARK	PUBLIC OWNERSHIP
GRAPE FERN	3	1	ROCK CUT STATE PARK	BUT PASSIVE PROTECTION
FALSE TARRAGON	2	2	PRIVATE	LOW
SMALL SOLOMON'S SEAL	2	1	PRIVATE	LOW
LARGE FLOWERED BEARD'S TONGUE	3	1	PRIVATE	LOW
SPOTTED CORAL ROOT ORCHID	4	1	PRIVATE	LOW
DOWNEY YELLOW PAINTED CUP (related to Indian Paintbrush)	5	1	PRIVATE	LOW
PRAIRIE DANDELION (not a dandelion related to daisy)	6	1	GREATER ROCKFORD AIRPORT AUTHORITY	SHORT TERM - ACTIVE PROTECTION LONG TERM - THREATENED BY RUNAWAY EXPANSION

LIVING AND OPEN SPACE

This section considers habitation of the land. It examines the status and trends of three factors influencing environmental quality: changes in county population; county development, especially urban sprawl; and open space and recreational lands.

From the peak in 1970 of 246,623, Winnebago County population had experienced a 1.1 percent decline by 1976. Winnebago County was not alone in a decline in population. The Chicago, Kankakee, and Champaign-Urbana-Rantoul regions also declined since 1970. Declines also occurred in neighboring Waterloo and Cedar Falls, Iowa; St. Louis, Mo; and Terre Haute, Anderson, and South Bend, Indiana. These declines are part of a nationwide population shift to rural areas and to western and southern states.

Between 1972 and 1976, the county lost 1,000 people compared with a decrease of 2,800 people since 1970. Between 1972 and 1976, there

were 9,900 more births than deaths in the county. However, this increase was less than the out-migration of 10,900. Along with the rest of the United States, Winnebago County had a decline in births between 1972 and 1976. Consequently, the Living and Open Space Profile, Table 6, shows this component in a satisfactory status and slightly improving trend.

These decreases in population were not spread evenly throughout the county. The City of Rockford had greatest losses. While the population of the county declined 2,800 people from 1970 to 1976, Rockford lost 6,800, while other portions of Winnebago County gained 4,000 people. Consequently, the incorporated and unincorporated portions of Winnebago County outside of Rockford have had to deal with increased population and its effects on housing, schools and taxes.

The population shifts together with new home construction has had a negative effect on agricultural and forest land in the rural portions of the county. During the past ten years, new housing units within Winnebago County ranged from a yearly low in 1970 of 880 to a high in 1968 of 3,698, with an average of 1,700. While in 1976 Rockford had 58% of the population of Winnebago County, from 1972 to 1976 only 23 of the new subdivision housing units were built in the city. From 1972 to 1976, 45% of all the land converted to residential use was in the northeast quadrant of the county which contains only 15-20% of the total land area.

Agricultural land decreased by 7% and forest land by 15% from 1969 to 1974. Since 1974, all indications are that more of these lands have been lost. In the early years, the effects of an increase in population on agricultural and forest land were not as great because the population was centered in the Rockford area. But from 1950 to 1974, 60,000 acres

of agricultural land was lost while forest land was reduced by 10,000 acres. In terms of food production, wildlife habitat, and maintenance of a diversity of urban and rural land in the county, 70,000 acres converted to residential uses has a significant negative effect on environmental quality and this loss is categorized in Table 6 as a serious problem with a worsening trend.

Citizens and government have attempted to control the situation, but have been mostly ineffective. In 1945, the interrelationship of Rockford and the rest of the county was recognized and the City-County Planning Commission was formed. However, with only a small staff at first and limited tools to work with, planning efforts were inadequate.

Between 1972 and 1976, some positive steps were taken by planning bodies and governments. The towns of Roscoe, Durand, Rockton, and Loves Park adopted zoning maps and regulations. Roscoe and Rockton also passed a subdivision ordinance to provide an additional tool to manage new development. In 1972, Winnebago County updated its 1942 zoning ordinance to reflect the growth that had occurred and to help contain future growth. In 1973, the City of Rockford also updated its zoning ordinance.

Another forward step concerned flood hazards and flood plain management. Major rivers -- the Sugar, Pecatonica, and Rock -- are subject to flooding. When low or wetland areas which formerly stored flood waters were drained or filled, it forced water into the streams, raising the water levels downstream.

Since 1972, the county has been a part of the federal Flood Insurance Program. This allows residents whose communities are in the Program to receive federally subsidized flood insurance for homes and

property. In return, the community agrees to enact ordinances that insure existing problems will not worsen by limiting urban development in flood hazard areas. Much data were gathered between 1972 and 1976 from a study undertaken in the county by the U. S. Department of Housing and Urban Development and the U. S. Corps of Engineers. The study is expected to be completed in 1978.

Urbanized areas cover land with impervious roads and houses, and storm drains increase the speed with which rainfall reaches streams, raising the peak height of flood waters and increasing soil erosion. Winnebago County passed a storm water detention ordinance in 1976 to combat this. It requires a developer to provide equivalent storage for runoff water as existed before development, usually by constructing a pond. Its purpose is to prevent increased stormwater from entering streams.

Nevertheless, as the county is experiencing significant unbalanced residential growth, patterns of land use in Table 6 is classed as a serious problem with a worsening trend.

Parks and open space are important factors in Environmental Quality within the county. Open space lands enhance the quality of life. The current open space was provided through the foresight of previous generations who clearly anticipated urbanization. Now the responsibility rests with us to provide adequate open space for future generations.

In Winnebago County, there are six types of park and open space areas. While there is no federal park land, there are some state-owned facilities. The largest, Rock Cut State Park, is owned by the Department of Conservation. It is a multi-purpose park that serves state-wide

and interstate users. Three-quarters of the campers come from outside the county to enjoy our natural landscape: 43% are from metropolitan Chicago, 24% from Winnebago County, 19% from out of state, and 14% from other parts of Illinois.

The Winnebago County Forest Preserves are the second major owner of park and open space. Forest preserves are developed with about 30-60% active recreational use and the rest for low intensity use such as hiking and fishing. Besides recreational uses, forest preserves provide additional benefits. They conserve portions of our natural resources, provide wildlife habitat, protect rare plants, lessen flood damage by serving as flood storage areas, help clean pollutants from the air, produce oxygen, serve a unique function in establishing open space corridors along rivers which gives the county form and identity, and breaks up areas of growth.

There are 23 communitywide parks located close to urbanized areas and 75 neighborhood parks which are smaller and within walking distance of users. Both communitywide and neighborhood parks are developed for more active recreation and have playing fields, tennis courts, picnic areas, and playground equipment. Communitywide parks are large enough to protect some natural features and are provided by the Rockford and Sumner Park Districts and the City of South Beloit. Neighborhood parks are provided by Rockford Park District; the villages of Cherry Valley, Pecatonica, Roscoe and Winnebago; and the Durand School District.

The fifth type of open space is golf courses, which are predominantly single use recreational areas. There are six courses run by the Winnebago County Forest Preserve District and the Rockford Park District.

Finally, there are three nature preserves in the county. These are

natural areas that contain extremely rare natural features such as habitats for endangered plants and animals. They are protected for educational and scientific use, and any development must be consistent with long term preservation. The nature preserves are owned by the Department of Conservation and the Winnebago County Forest Preserve District.

Two categories of parks and open space have adequate acreage for the county's present needs, but the other three are significantly inadequate. There are generally accepted standards for the amount of park and open space land in relation to population. These have been modified by county planning and governmental officials to reflect our specific situation. These projected needs of park and open space are designed to meet multiple purposes. Recreation is a traditional use of parks and open space. Forest preserves and park lands minimize potential damage from development of flood prone land and also provide animal and plant refuges. The multiple benefits of parks and open space are often reflected in higher property values for nearby land.

The Living Space Profile, Table 6, shows the current status and trend. At the end of 1976, the Winnebago County Forest Preserve District had 1,300 acres less than it should have. Communitywide parks had adequate acreage though the distribution was unequal because some communities have done little to provide this resource to its citizens. Neighborhood parks have the second major shortage (450 acres). Golf courses are in the best position because more acreage is provided than is necessary to meet countywide standards.

The Forest Preserve District, using good foresight, acquired its first properties in the 1920's when the county population was only 90,000. Over the period between 1924 and 1930, the district acquired 900 acres. By current standards this was still 600 acres less than were required. From 1930 to 1970, essentially no new land was acquired (200 acres were donated) despite a population increase of 110%. Since then, the Forest Preserve District has played "catch up" so that instead of being 2,300 acres short at the end of 1976, it was only short by 1,300 acres. In late 1975, with prodding by citizens, the Forest Preserve District approved a $2 million bond issue to acquire additional open space land. But that is not the final solution. From 1972 to 1976, the Forest Preserve District added 824 acres at an average cost of $800 per acre. With these bond funds, the Forest Preserve District may acquire sufficient acreage to make up for the current deficit. The right-hand column of Table 6 shows that 2585 more acres are needed from 1976 to 2000 to make up for the current shortage and future needs.

The largest park district in Winnebago County is Rockford Park District, which includes a considerable area outside the City of Rockford, including Loves Park. The amount of community park land available in Winnebago County at the end of 1976 was adequate. From 1972 to 1976 this position was strengthened by the acquisition of 26 acres. From 1976 to 2000 an additional 576 acres will be needed.

The second greatest current shortfall in public park and open space in Winnebago County is neighborhood parks. There is a shortage of 450 acres. Neighborhood parks are the most expensive to acquire because

they are generally in areas of urban development. The Rockford Park District acquired 34 additional acres of neighborhood parks between 1972 and 1976. Land acquired by the Rockford Park District before 1972 cost an average of $880 an acre. By 1976, the average cost increased almost eight times to $6,700 an acre, and the increase will continue. Neighborhood parks also have the second largest total need for expansion from 1976 to 2000 of 767 acres.

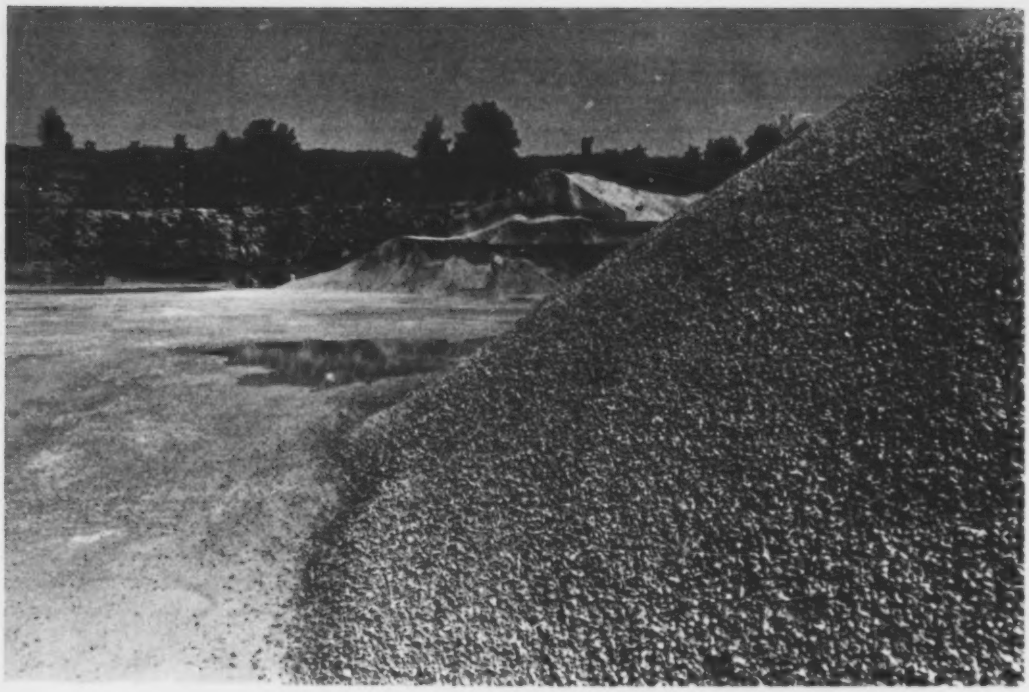
Golf open space was in the best situation in Winnebago County at the end of 1976, and needs only 134 more acres by the year 2000. Since the Winnebago County Forest Preserve District planned to acquire a 160-acre course in 1977, the provision of open space for golf will have been met until the end of the century, with seven of ten golf courses now owned by public agencies.

Nature preserves, because they are unique irreplaceable natural areas, do not have a per capita standard. However, a state-wide Natural Areas Inventory has identified 176 acres of high quality potential Nature Preserves in Winnebago County that should be acquired. All three of the existing Nature Preserves were acquired between 1972 and 1976. The 67-acre Rockton Bog and 53-acre Harlem Hills are owned by the Department of Conservation. Colored Sands, 44 acres, is owned by the Winnebago County Forest Preserve District.

TABLE 6

LIVING SPACE PROFILE

	STATUS	TREND	
POPULATION CHANGE	SATISFACTORY	SLIGHTLY IMPROVING	
COUNTY DEVELOPMENT AGRICULTURAL AND FOREST LAND	SERIOUS PROBLEM	WORSENING	
PATTERNS OF LAND USE	SERIOUS PROBLEM	WORSENING	
OPEN SPACE AND RECREATIONAL LANDS			FUTURE NEEDS 1976-2000
FOREST PRESERVES	SERIOUS PROBLEM (1335 acres short of 1976 standard)	SLIGHTLY IMPROVING	2585 ACRES
COMMUNITY PARKS	SATISFACTORY (49 acres over 1976 standard)	UNCHANGED	576 ACRES
NEIGHBORHOOD PARKS	SERIOUS PROBLEM (454 acres short of 1976 standard)	UNCHANGED	767 ACRES
GOLF COURSES	SATISFACTORY (101 acres over 1976 standard)	UNCHANGED	134 ACRES
NATURE PRESERVES	AREA OF CONCERN MORE ACTION NEEDED	IMPROVING	176 ACRES



MINERAL RESOURCES

The relatively flat landscape of Winnebago County offers little hint of its dramatic history. To understand how mineral deposits correlate with environmental quality, it is important to examine the massive forces that shaped our land.

At least four major periods of glaciation have occurred over Illinois during the past 1,200,000 years. There is direct evidence that the last two glaciations affected Winnebago County. Tremendous change was wreaked by the Illinoian glaciation, which ended about 175,000 years ago, and the Wisconsinan, which ended some 7,000 years ago.

During each period, glaciers repeatedly moved from the north and northeast, receding and then returning. Mile-thick layers of ice carrying enormous quantities of rock and water inched back and forth across the land. When the last glacier melted, it left a layer of mixed clay, silt, sand and rock materials collectively called "glacial till."

Torrents of melt water came down the ancient river valleys, filling them with sand and gravel deposits as deep as 300 feet in the Rock River Valley. In the Pecatonica Valley, the water became dammed during several glacial periods creating temporary lakes in which finer sediments of silt and clay were laid down.

In the southern portion of the county glaciers diverted the Kishwaukee and Rock rivers from their valleys, forcing them to curve to the west where they cut gorges into the bedrock.

The "new" Kishwaukee River gorge can be seen distinctly in the Kishwaukee Forest Preserve. The steep valley walls of the Rock River Valley in Ogle County show the new gorge of the Rock.

The outwash from the melting glaciers had a "leveling" effect. Before tremendous amounts of sand and gravel and rock were deposited in the bedrock valleys, the highest point in the county was more than 500 feet above the lowest. Today there is only a 300-foot variation.

The bedrock is far more ancient than the glacial material. Composed of limestone and sandstone made up of tiny sediment particles pressed together, it is as much as 500,000,000 years old and from 2,000 to 2,800 feet thick. It was deposited when the entire area was covered by a great salt water sea. The lime in the bedrock is made up in part of the shells and skeletons of sea animals that settled to the bottom.

The underlying soil layers were silt borne by winds from the west, primarily the Mississippi River Valley, and reach a depth of eight feet in western Winnebago County and taper to five feet in the easternmost part.

The topsoils reach a depth of 16 inches and consist of 10-20% plant and animal remains mixed with weathered, underlying, windblown silt.

In Winnebago County there are essentially two types of materials

extracted for use. One is sand and gravel, which is of glacial origin, and the other is limestone, formed long before the glaciers came. Both are non-renewable resources.

Gravel primarily is used for aggregate in concrete and is important in building roads and structures and ballast underlying railway tracks. Interestingly, it is finding a new use as heat storage for solar heating devices. Sand is also used primarily as aggregate in concrete and asphalt.

U. S. Bureau of Mines statistics from 1970 to 1975 indicate no clear trends as shown in the Profile, Table 7, although the tonnage was highest in 1972. The range of production, which varies widely depending on the construction activity in the region, was between 856,000 and 1,414,000 tons per year.

Most sand and gravel is mined in the ancient Rock River Valley areas, with most mining sites located on the east side of the Rock.

Most available limestone is of the dolomite variety, high in magnesium carbonate. The quarries are found throughout the county wherever the limestone layer is not covered by thick glacial till. Limestone use is even more variable than that of sand and gravel, and ranged from 393,000 to 1,314,000 tons annually; consequently, its Profile classification, Table 7, of no valid trend. Production level rose until 1972 and has steadily declined since.

Winnebago County remains well-endowed with these mineral resources. According to the Soil Conservation Service, there are 1,330 acres of sand and gravel pits and 26,000 acres outside the urbanized area where sand and gravel are within five feet of the surface. Correspondingly, there are 500 acres of limestone quarries and 36,000 acres in the county where limestone and dolomite are within five feet. Although these

acreages are large, it is unlikely that all areas contain deposits of sufficient thickness or quality to be economically mined. Nevertheless, the status of the Mineral Resource Profile, Table 7, for both sand and gravel, and limestone is categorized as satisfactory.

TABLE 7

MINERAL RESOURCE PROFILE

	STATUS	TREND
SAND AND GRAVEL	SATISFACTORY	NO VALID TREND
LIMESTONE	SATISFACTORY	NO VALID TREND

Although the quantity of such materials is high, many acres of sand and gravel have been lost from possible use due to urban expansion. Large sand and gravel deposits lie under the City of Loves Park and the rapidly developing area from Loves Park to Roscoe.

NOISE QUALITY

Noise pollution is a component of Environmental Quality that few people are familiar with. Federal government statistics indicate 44% of the people in Winnebago County are subjected to unhealthy noise levels.

Essentially, noise is "unwanted sound." When sound reaches disagreeable levels, it becomes a threat to health and well-being. Increased noise is correlated with expanded energy use and population. Noise is a byproduct of energy use. Technical analysis has shown that the quantity of noise from a mechanical device is directly related to its power. As more energy is used by society, the noise level increases. Without noticing it, people are losing their hearing because of a bombardment of noise.

Besides outright hearing loss, noise can cause physical and emotional disorders. It has been estimated nationally that one out of twelve people has suffered a hearing loss, and it is a major type of industrial injury.

Temporary hearing loss occurs when an individual is subjected to a high noise level. This causes the threshold level at which they can hear to be raised. If subjected to the high noise routinely, then the higher noise threshold becomes permanent and there is a hearing loss. Human beings can recuperate from short periods of loud noise if they have sufficient quiet rest between noisy periods, but not when high noise is routine.

There are essentially three ways to control noise: controlling it at its source; modifying the noise path to the recipient; providing protection for the person affected by the noise.

Protection of Illinois citizens from noise has slowly begun. The Pollution Control Board issued its first noise regulations in August, 1973. The initial approach taken by the Board was to establish stationary noise standards. These standards limit the amount of noise emitted across property lines that affect people in the surrounding area. Through the Occupational Health and Safety Act, the federal government took part of the responsibility for establishing and enforcing protective noise levels for workers. The Department of Labor enforces standards inside business operations and the EPA enforces standards limiting noise crossing property lines.

Unlike air and water polluters, noise emitters are not required to obtain permits from the IEPA. Rather, the enforcement program relies upon citizen complaints. If a citizen notifies the Noise Section of the

IEPA in Springfield, the Agency will come to the site and, using sound level meters, determine if the noise exceeds the standards established in the 1973 regulations. If it is too high, the IEPA will notify the noise source and assist in lowering the levels. Failure to comply can result in a fine by the Pollution Control Board.

There is limited data on noise complaints within Winnebago County from 1972 to 1976, but many locations had multiple complaints. In 1972, there were complaints concerning four locations; in 1973, eleven; in 1974, four; in 1975, four; and in 1976, seven. Examples of areas that had noise complaints were construction sites (unfortunately not covered by the regulations), industrial plants, truck terminals, dog kennels, grain elevators, junk yards, fire sirens, and speed boats. These figures understate the noise problem in Winnebago County because few citizens are aware of the IEPA noise control program.

In 1975, the USEPA issued noise standards for trucks over 10,000 pounds. Technical studies have shown that while trucks comprise only ten percent of vehicles on the road, they produce seventy percent of the noise. The follow-through on enforcement, which is the responsibility of the federal Department of Transportation, has not been effective. There are only 120 inspectors for the entire country whose primary purpose is to insure that trucks meet safety standards. Therefore, with their small numbers and noise control not a primary emphasis, truck noise has not been reduced appreciably.

The USEPA has also been working on regulations for new products, is experimenting with redesigning trucks, cars, and home products to see whether noise levels can be reduced, and has proposed regulations for railroad noise.

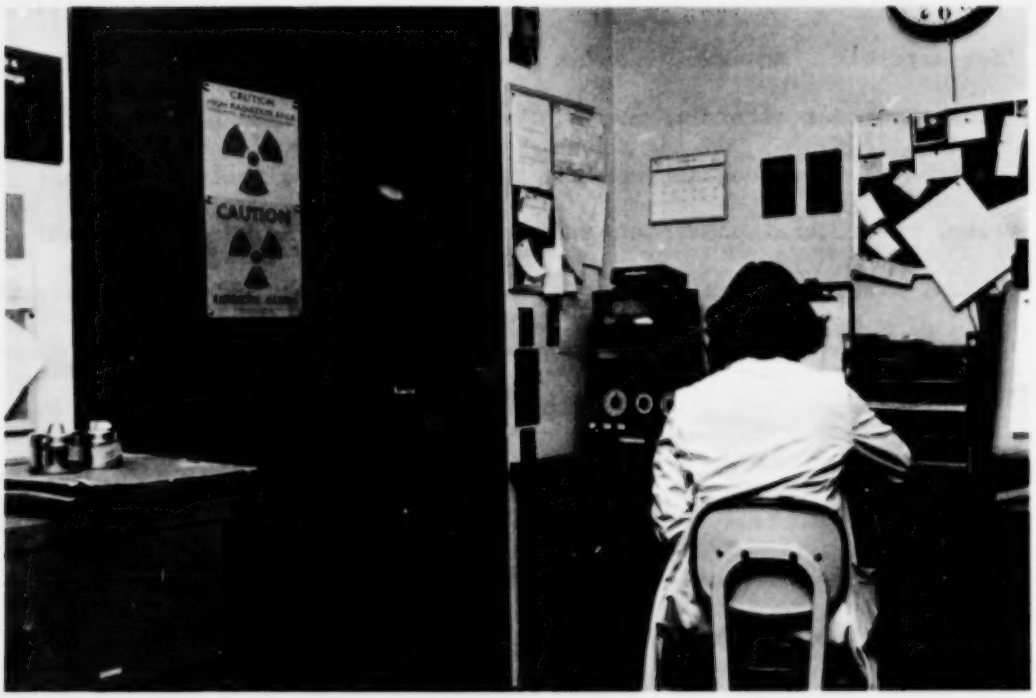
The Federal Aeronautics Administration (FAA) has issued regulations for aircraft. However, the FAA standards only affect new aircraft. The older, noisier aircraft have not been required to add noise reduction devices to their engines because the installations would be expensive. Also, the federal government has not established standards for individual airports. The Greater Rockford Airport does have a significant impact on noise levels within the southeast portion of Winnebago County.

Looking at the Noise Quality Profile, Table 8, for 1972-76, the status of both ground transportation sources and airports and aircraft are serious problems with increasing noise levels. Construction noise, while temporary in nature and consequently not as great a source as vehicles and aircraft, is still an area of concern, nevertheless, and its noise is worsening. Lastly, industrial noise is an area of concern, but its noise levels have stabilized and begun to improve.

TABLE 8

NOISE QUALITY PROFILE

SOURCES	STATUS	TREND
GROUND TRANSPORTATION	SERIOUS PROBLEM	WORSENING
AIRPORT/AIRCRAFT	SERIOUS PROBLEM	WORSENING
CONSTRUCTION	AREA OF CONCERN MORE ACTION NEEDED	WORSENING
INDUSTRIAL	AREA OF CONCERN MORE ACTION NEEDED	SLIGHTLY IMPROVING



RADIATION

Radioactive decay is the breakdown of atoms, the basic building blocks of all matter. As atoms break down, small particles, called radiation, some containing great energy, are given off. Because some particles are harmful to humans, they affect Environmental Quality. Nationally, the concern with radiation began slowly after World War Two when the first nuclear bombs were used. It has grown into a major debate as to the benefits and hazards of nuclear energy.

The primary threat to human health associated with radiation is its ability to cause physiological changes and cancer. Because some radioactive materials can last from 20 to 500,000 years, there is concern with the environmental risk of long term contamination of land, air, water, and other resources.

The left side of the Radiation Profile, Table 9, gives perspective to the levels of radiation experienced by the average person in Winnebago County each year. Natural radiation is the major source. We receive it from the atmosphere, natural decay of local minerals, and food. There has been no significant change in these levels, and as people have been subjected to these levels for thousands of years, they are considered safe. Global fall-out from open air testing of nuclear bombs is the second highest source. The United States and Russia stopped this testing and exposure declined by two-thirds between 1960 and 1970. As there were no nuclear power generating stations in the county or region from 1972 to 1976, this was not a local source of radiation. Nationally, the average citizen received 0.003 millirem from nuclear energy production.

The radiation from shipments through the county of radioactive waste from nuclear power plants is too low to be measurable. As shown in Table 9, the subtotal from environmental sources, the subject of this report, is 80 millirems. By comparison we have shown some individual sources on the Profile. The average person receives a low level of radiation from work, consumer products or airplane travel. This would give a total of 83.4 millirems. For comparative purposes the level of radiation from an x-ray is shown. One stomach x-ray is almost the same as all other sources.

While it is not important to understand the units of measure of radiation, nuclear scientists established a safe level of exposure and then lowered it fifty percent to assure maximum safety. That level is 500 millirem. The average radiation received by a person in Winnebago County is one-sixth this level (assuming no x-rays). With a stomach x-ray it is less than one-third the safe level.

These average levels do not indicate the result should a radiation accident occur near or in the county. Illinois has reason to be concerned. At the end of 1976, Commonwealth Edison was producing forty percent of its electrical energy from nuclear sources. It is expected that in ten years this will increase to 55%. Illinois has more operating commercial nuclear power reactors than any other state. In addition to nuclear power plants, Illinois has the only commercial high level radioactive nuclear fuel waste storage facility at Morris; a low level radioactive waste burial site near Sheffield; and a uranium conversion facility at Metropolis on the Ohio River.

Of more local interest is the fact that high level radioactive nuclear fuel waste from Minnesota and Wisconsin is shipped through the county to the Morris storage facility. These shipments represent the largest potential radioactive health hazard in Winnebago County. As reported in the media, these shipments, which take place about fifty times per year, have been moved on U.S. 51 through the county's population center. Should the protective casings be broken, the used fuel would kill anyone within twenty feet and seriously affect others. Only specialized trucks with thick steel and lead casks costing around $2 million are allowed to carry the material. Because of these special casks, the trucks are classified as "overweight" and can only utilize the best roads and bridges. For this reason, they take U.S. 51 through Rockford rather than going through rural areas. While the public health effects of a break in a cask are very high, the Illinois Department of Public Health believes the risk is low. The casks must meet federal standards. Consequently, the Department of Public Health feels the casks are safe enough that they need not be continuously tracked within the state. From 1972 to 1976, the regulation of nuclear material in

interstate shipments was the responsibility of the Federal Nuclear Regulatory Commission, working cooperatively with the Department of Transportation. The State of Illinois was not involved in regulating the shipment of radioactive materials through Winnebago County from outside the state. Nevertheless, the transportation of spent nuclear fuel through the county should be an area of concern to residents as shown on the Radiation Profile, Table 9.

The U.S. Supreme Court has said that regulating construction and operation of nuclear power plants is a federal responsibility and has pre-empted the state. However, Illinois has adopted the federal regulations on operations and construction as state law to insure the plants operate within federal standards. This responsibility was given to the state Department of Public Health which also performs off-site radiation monitoring and emergency preparedness plans in the event of an accident. It also insures that medical and industrial usage of x-ray machines and radioisotopes are carried out safely.

Examination of the two state regulatory programs involving Environmental Quality shows the types of protection available. In off-site regulation, the Department of Public Health samples air; ground and surface water; food for human consumption grown or produced in the area; and soil and sediment for the presence and level of radiation. At the Byron nuclear station in Ogle County, background testing for control purposes started in the summer of 1977. This protective monitoring will allow citizens to keep track of any changes in radiation levels in the county and any possible dangers.

For baseline information at the Byron nuclear plant, the Department of Public Health instituted air quality monitoring at the end of 1973.

In analyzing the data, the amount of radiation remained at a fairly constant low exposure level in Winnebago County.

The county is affected by open air nuclear bomb testing, however. While the absolute levels received from this testing are not large, it is indicative of the smallness of our planet. In the fall of 1976, the Republic of China exploded nuclear bombs at low altitude. Because these were low altitude explosions, it took one to two weeks for the radiation to move over the county. The air radiation levels increased almost seven times above the natural level. This did not cause a public health hazard because the higher radiation levels lasted for only two months and the highest level reached was only one-sixth of the annual average safety limit. Some of the radioactive material from the Chinese explosions also went higher into the atmosphere, and natural weather changes in the spring again caused increased radiation levels. Tests by the State Department of Public Health showed that the short-lived radiation was barely detectable in local raw milk supplies during this period.

Looking at the status and trends of the Radiation Profile, Table 9, there is cause for both optimism and concern. Natural radiation levels have remained constant and are no cause for concern. Global fallout from open air weapons testing has decreased since 1960, but that is an international problem over which the residents of Winnebago County have no direct control. A continuation of the trend cannot be assumed because it depends on the actions of independent foreign nations. As there was no production of electricity from nuclear energy during 1972-76, there was no status or trend from nuclear power. The shipment of used radioactive fuel from power plants in Wisconsin and Minnesota through the most populated parts of the county is an area of concern.

TABLE 9

RADIATION PROFILE

TYPE OF RADIATION	AVERAGE DOSE MILLIREMS/YEAR	STATUS	TREND
ENVIRONMENTAL			
NATURAL	76.0	SATISFACTORY	UNCHANGED
GLOBAL FALL-OUT	4.0	AREA OF CONCERN MORE ACTION NEEDED	SLIGHTLY IMPROVING
NUCLEAR POWER	.0	NOT APPLICABLE	
RADIOACTIVE WASTE SHIPMENTS THRU COUNTRY	.0	AREA OF CONCERN MORE ACTION NEEDED	NO DATA
	SUBTOTAL 80.0		
INDIVIDUAL			
OCCUPATIONAL	.8		
TV, CONSUMER PRODUCTS AND AIR TRAVEL	2.6	NOT APPLICABLE TO NATURAL ENVIRONMENT	
X-RAY (STOMACH)	72.0		
TOTALS WITHOUT X-RAY / WITH X-RAY	83.4* / 155.4*		

*(NATIONAL RECOMMENDED MAXIMUM DOSE OF RADIATION/YEAR = 500)

SOIL CONSERVATION

Soil is a vital natural resource in Winnebago County. In 1974, 79% of the land in the county still was used for agriculture. The value of crops was $25 million in 1975. Agriculture directly or indirectly supports a large number of people in the county. Topsoil provides nutrients for plant growth. It is important to conserve this soil for future generations of farmers in the county and to maintain the agricultural land base of the county.

Concern with erosion in Winnebago County started in the early 1900's and climaxed in 1934. This was epitomized by the Dust Bowl of the Great Plains. Because of harsh weather and poor soil management, the topsoil literally blew away.

The Winnebago County Soil and Water Conservation District, which has a local board of directors and is financed by the Winnebago County Board and the State with technical assistance from the United States

Soil Conservation Service, is the leader in promoting the wise use of our soil. Because of the rapid growth of the world's population and the fact that agricultural land is limited, a new perception of soil must be adopted. We must develop methods of food production that perpetuate the use of soil. The Soil Conservation Service considers sustained or perpetual agriculture the practice of only allowing that amount of soil loss which can be replaced by the leftover organic materials from crops and fertilizer.

Soil erosion is caused by wind and water. One need only see photographs of the dust storms in the Great Plains to realize the power of wind to remove soil from the land. Rain can have an equal if not more devastating effect. Raindrops may fall with enough force to splash soil particles up to two feet high and five feet wide. Wind and rain combined with the type of soil, the slope of the land, and how the land is being treated give an indication of the potential for soil erosion.

In the county 84% of soil erosion occurs on crop land; pasture land, 2%; forest land, 3%; and all other land, 11%. The soil loss of the county every year is approximately 1.1 million tons. The critical nature of the problem is put in perspective when it is understood that in the 150 years of county settlement, an average of 50% of the topsoil has already been squandered. There are many direct and indirect costs of soil loss. The soil contains nutrients which save farmers fertilizer costs each year. Since county agricultural lands lose approximately 950,000 tons of soil per year, farmers would need to spend approximately $4.8 million to replace the nutrients lost through erosion. There also is damage due to soil filling ditches, waterways, ponds, and streams. It costs $1 per ton to clean out these waterways for an additional loss

to taxpayers of approximately $1.1 million. The total economic loss to Winnebago County is over $6 million per year due to soil erosion. This does not include environmental costs.

The best information on soil loss concerns cropland. However, the soil loss in urban areas is increasing at a faster rate than cropland loss due to the accelerated urban development in the county. Winnebago County, with its rolling topography, has more sloping cropland than most central Illinois counties. About 60% of the county's 170,000 acres in cropland has potential for soil losses greater than the sustained or perpetual agricultural level. It is estimated that one-third of this land -- 34,000 acres -- is being properly cared for and the soil loss is less than the sustained level of 2 to 5 tons per acre. But two-thirds -- 68,000 acres -- is losing more than the perpetual agricultural level. Half of these are losing sixteen tons or more. This means that the farmer is losing two bushels of soil for each bushel of crop. The average loss per acre for the county is 5.6 tons per acre per year.

The environmental impact of the loss is dramatic. In the late 1960's, when the Department of Conservation was considering what could be done to improve the poor fishing possibilities in the lake in Levings Park, it was discovered that the lake had filled in almost six feet with silt since its construction. This loss of water level and the continuing high rate of sedimentation made any practical efforts to revive the animal and plant life impossible.

When the soil enters our waters, it is called sediment. Sediment is the major transport vehicle for pollutants such as phosphorous, nitrogen and organic matter. In ponds and lakes with algae problems due to excess nutrients, sediment is often the cause. Pesticide pollution of the waterways also is linked to sediments because pesticides attach

to the soil particles in the same manner as phosphorous. These longer lasting pesticides are taken in by plants and animals and are ingested by humans eating fish from the river. While many of the longer lasting pesticides, such as DDT, are no longer used, the sediments on the bottom of the Rock River, Levings Lake, and other streams and ponds still contain them.

Peak soil loss occurs in spring and summer, the most critical times for reproduction and growth of aquatic plant and animal life. High levels of sediment severely impair these processes because the sediment fills and destroys shallow swamps and marshes where fish and waterfowl congregate to feed and reproduce. The sediment can also carry disease and infectious organisms.

Soil erosion can be controlled and reduced. The Soil and Water Conservation Districts throughout the nation work with farmers to establish conservation plans and help with management techniques to minimize soil erosion. The Winnebago County Soil and Water Conservation District has been successful in protecting approximately one-third of the most erodable soil in Winnebago County. However, several factors were at work from 1972-76 which reversed some of the gains achieved by the Soil and Water Conservation District and the farmers. Farm product prices rose due to the increasing world demand for grain. Also, the federal government ended programs which encouraged farmers to leave some of their land in non-crop uses. A continuing decline in the number of dairy farms and pasture in the county, changes in farming technology, bigger equipment, greater use of fertilizer, and shifts away from crop rotation also contributed. The result was more land put into row crops in the county. In 1972-76, the total acreage planted increased by 14% from 148,750 acres to 169,500 acres. Some farmers took short term actions to the detriment of long term perpetual agriculture. Many

former standard soil conservation practices were abandoned. Grass waterways, which safely remove rainfall without causing gully erosion, have been plowed, terraces have been taken out, and the practice of plowing across the slope to slow run-off has been abandoned.

Yet there is some hope. An important part of the non-point source water pollution program of the IEPA is working with farmers to develop techniques and regulations to reduce soil erosion with its impact on water quality. A reduction in the amount of soil lost and its impacts on water quality, also means a more perpetual agricultural system for the future.

There are three techniques which the Soil Conservation Service feels would be beneficial for reducing soil loss. The first method is called conservation tillage. The current practice is to utilize mold-board plows to turn the soil over in the fall, making it easier to prepare the land for planting in the spring. However, this plowing opens up the soil to wind and rain during the winter or early spring. A new type of planter can be utilized which cuts the soil in a narrow row and just deep enough to put in the seed. This method combined with leaving plant residue from the previous crop reduces the soil loss by 60-70%. Two other conservation tillage methods, chisel tillage and till plant, result in similar soil loss reductions. In a survey of county farm implement dealers, approximately 50% of all new plows purchased in the county are chisel plows used in chisel tillage, and their share of the plow market has increased 5-10% over the last five years. Conservation tillage is the most effective technique and can be implemented

by the farmer at low cost.

Contour farming and terracing are more effective in steeper portions of the county. Contour farming means preparing and planting across the slope rather than up and down. This does not allow water to move quickly down the slope carrying soil. This method can be implemented at moderate cost. Terracing is most effective on longer slopes. This requires constructing a series of channels and ridges across the slope to prevent rapid water run-off. Because of the necessary earth moving, it is the most expensive.

Because of the importance of these soil conservation practices, the Agricultural Stabilization and Conservation Services of the federal government will share the costs of these techniques with the farmers. From 1972-75, the Service increased cost sharing.

As the Soil Conservation Profile, Table 10, indicates, soil loss is a serious problem in Winnebago County. It probably worsened during the period from 1972-76, but there are no data to prove it. The last county survey was ten years ago. The technical solutions to soil loss are listed as areas of concern. There is some improvement with those farmers who are working with the District, but actions of other farmers could create a net negative trend. Consequently, there are insufficient data to establish a trend for the solutions.

TABLE 10

SOIL CONSERVATION PROFILE

PROBLEM	STATUS	TREND
LOSS OF SOIL	SERIOUS PROBLEM	WORSENING

SOLUTIONS		
CONSERVATION TILLAGE	AREA OF CONCERN MORE ACTION NEEDED	INSUFFICIENT DATA
CONTOUR FARMING	AREA OF CONCERN MORE ACTION NEEDED	INSUFFICIENT DATA
TERRACING	AREA OF CONCERN MORE ACTION NEEDED	INSUFFICIENT DATA

SOLID WASTE

Solid waste has traditionally been thought of as something better ignored. The government defines it as garbage, refuse, and sludge from sewage treatment plants as well as other non-nuclear discarded material whether solid, liquid or semi-solid from industry or business which doesn't enter the sewage system. However, it can be a resource. As garage sales indicate, what some people do not want anymore, other people will buy and use. This is true with most solid waste.

Since the 1940s, each of us has been using more and more resources, with a corresponding increase in the amount of solid waste. It appears that these levels may have stabilized. For the years 1972-76, the tonnage figures for the City of Rockford have fluctuated within a narrow range. The average person in Winnebago County throws away 700 pounds of material annually, or about 2 pounds a day. Industry and business throw away an amount equal to that of all residents of Rockford. For the county, the solid waste production is projected at 185,000 tons per year

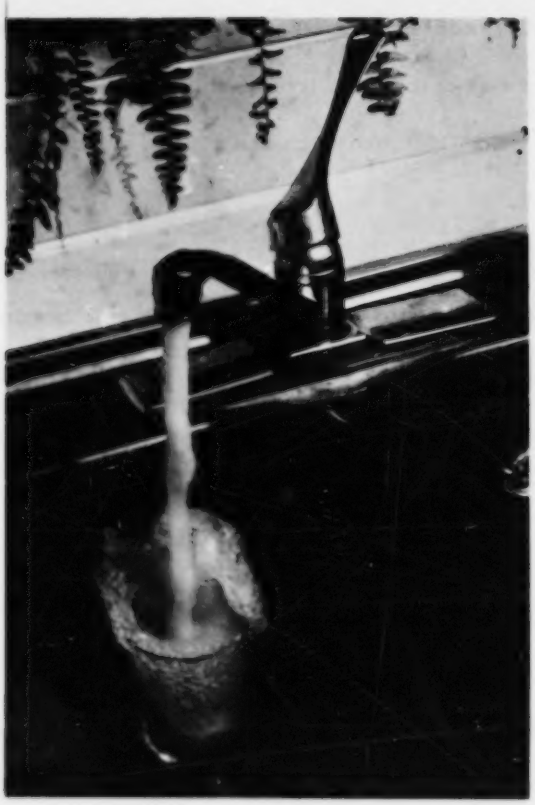
or 500 per day. There are no figures for the make-up of the county's waste, but national figures indicate that 40-50% is paper products, 10-20% is food wastes, 10% is metals, 10% is glass and ceramics and 10% is yard waste and wood. One item that is not included in the waste totals is sludge from sewage treatment plants. The Rockford Sanitary District, the largest in the county, contributes about 10,000 tons per year.

As of 1976, both the sludge and solid waste in Rockford is disposed of in landfills. Yet, landfills are a political issue because no one wants to have one near home. Except for newspaper, none of the solid waste is recycled. As the largest waste category is paper products, the City of Rockford set up a curbside pickup newspaper recycling program which is profitable. Because of this, the Solid Waste Profile, Table 11, indicates the status as a serious problem, but with insufficient data to determine if there was a trend.

TABLE 11

SOLID WASTE PROFILE

	STATUS	TREND
SOLID WASTES	SERIOUS PROBLEM	INSUFFICIENT DATA



WATER QUALITY

Water is required to sustain life, making it an important component of Environmental Quality. But drinking is only one of the many uses of water in our modern society. There are the traditional household uses, paralleled in industry, such as washing or cleaning, and disposal of sanitary wastes. Many larger industries also use significant quantities of water in manufacturing processes for cooling. The rivers, streams, and other water courses serve many recreational uses, such as boating and fishing, and where water is adequately clean, swimming. Waterways attract recreational use on adjacent land. Many of the county's most popular parks and forest preserves are by lakes and streams. It is because water has so many uses that conflicts arise among users over its quality.

The waters utilized in Winnebago County are of two kinds: surface waters - the major water bodies being the Kishwaukee, Pecatonica, Rock, and Sugar Rivers - and the ground water from which the drinking water supply is obtained.

Stream Water Quality

Excluding the waterways forming our state's borders, the Rock River is the second largest river in the state. The Rock flows south from its origins in Horicon Marsh in Wisconsin. Madison also is within the Rock's watershed, and the river receives its sanitary wastes. The Kishwaukee River has two branches - the North, drains Kane, McHenry, and Boone Counties and the South, DeKalb County.

Before European settlement, the Rock River was a free-flowing river that wound through tall grass prairie and forests. The vegetation helped keep the Rock River clean and beautiful. The Indians did not degrade the river, but European settlement brought five changes that negatively affected the quality of water in the county. First, damming the river eliminated its free flow, allowing more sediments to settle on the bottom, and made the river more shallow. Second, many headwater and backwater wetland areas which served as natural filters and storage for rainwater have been drained or filled. Third, indoor plumbing transports pollutant wastes into the streams. Fourth, storm sewers collect rainfall from the urban areas and direct it to the streams. Fifth, population density within the Rock River watershed taxes the river's natural capability to break down and dilute pollution.

Widespread public concern regarding water quality began in the 1960's. At that point many streams and water bodies around the state and nation had very low water quality. So low, in fact, that the

Illinois Department of Conservation stopped stocking fish in the streams because they soon died.

In 1965, the federal government, recognizing the regional, interstate and national implications of water quality, passed legislation establishing standards to balance the conflicting uses of the waters.

In 1972, the federal government radically changed its objectives for water quality. It decided the best way to meet the long term objective for water quality would be to eliminate the disposal of wastes into the waters. For the short term, it decided to raise the water quality to support balanced populations of animal and plant life and recreation in and on rivers. Three key action points were established with the goal of elimination of discharged waste in 1985.

Both pieces of federal legislation established a partnership with the states. In Illinois the Pollution Control Board and the IEPA establish and enforce water quality standards. Illinois had had water quality standards since early 1967. The current standards established by the Pollution Control Board were adopted in 1972 after extensive public hearings. The board established standards at a level necessary to protect the animal and plant life in streams and to allow a full range of activities, such as swimming or fishing.

There are two types of standards. The first are general water quality standards for any part of a lake or river. The second, effluent standards, control the amount of waste that may be put into the water body. The regulations also require that all industry and municipalities obtain permits and use discharge controls to limit waste put into the waters. It was mandated that by July 1, 1977, a more complete secondary waste water treatment system be installed.

During 1972-76, Winnebago County did pretty well in complying with the objectives and standards set by the federal and state governments to clean up the waters. Permits to put waste water into the streams have been obtained by virtually all industries and municipalities and they either have or are on the way in installing clean up equipment. Compliance with the permits is fairly good, but there are still sources that are evading the law and the IEPA does not have enough inspectors to catch them.

The costs of the clean up efforts have been significant. The reason is that in a little more than a decade, 150 years of abuse to the waters is being stopped and reversed. To reduce these costs, the taxpayers are sharing the burden through tax incentives to industry and government grants to municipalities and sanitary districts. For municipalities and sanitary districts alone in Winnebago County, the local, state, and federal funds that have been spent through 1976 total $28,000,500. Grants already have been received for an additional $33.3 million for construction between 1976 and 1980, with proposals for an additional $5.5 million. The projected total for facilities in Winnebago County from the late 1960's through 1980 is $67.2 million. The Rockford Sanitary District's share would be $62.2 million or 92%.

The effluent standards are determined on the basis of waste water concentration during the lowest flow of a stream. It varies considerably between the rainy spring and the dry summer. Since waste discharges are fairly constant, those pollutants have significant effects during dry periods. For instance, Durand, Seward, and Winnebago are located along streams that often have no natural stream flow during the summer. At that point, the waste water is 100% of the flow. In this

case, it is critical that the standards for treated effluents be designed to protect public health and aquatic life or the stream becomes an open sewer.

To determine if standards are being met, the IEPA established a stream sampling network thoughout the state to monitor general water quality. These monitoring stations conduct 22 different chemical tests for such pollutants as bacteria from animal waste, nitrogen and phosphorus, cyanide and other toxic chemicals, and heavy metals, such as copper and lead. In addition, industrial dischargers and sewage treatment plants are required to submit periodic reports on the quality of their discharges which are spot checked by IEPA and Winnebago County Health Department (WCHD). IEPA has ten river sampling stations in the county, and each year between eight and twelve samples are taken at each station. The WCHD also takes samples monthly at eleven sites. The Water Quality Profile, Table 12, indicates the Water Quality Index level for the rivers of Winnebago County for 1971-76. This index was developed by the IEPA to correlate the chemical quality of the stream with the health of the aquatic life. An "A" rating indicates good stream quality - both chemically and biologically. "B" means average stream quality. "C" indicates a semi-polluted river, while "D" means polluted. Table 12 shows the quality of the major rivers and streams and how it has changed during the last five years.

The Kishwaukee River and Kilbuck Creek are in the "A" and "B" categories of good or average stream quality, with only one exception. Analyzed statistically, the changes from year to year do not indicate any trend of improvement or decline.

Looking at the three stations on the Pecatonica and Sugar Rivers in

each year except 1974, the stream qualities were either "A's" or "B's." Though 1974 was worse, statistically their quality shows no change.

As there are only three sampling stations on the Rock River in Winnebago County, a fourth was included in Ogle County to show the changes in quality as the river moves south of the Rockford urban area. As the Rock River enters the county from Wisconsin, the quality is pretty good, mostly at the "B" or average level. However, the index levels for the two Rock River stations south of Rockton and at the Rockford Sanitary District, which reflect the county's impacts, are lower with mostly "C" or semi-polluted conditions. Statistically, there are no trends from year to year at these three stations because over the five-year period the levels have gone up and down and the differences between the stations are not significant. Nevertheless, the stations have the lowest levels in the county and the Rockton site recorded the only "D" or polluted level in 1975. The values at Byron show improvement over south Rockford. This is because there is relatively little waste entering the Rock between Rockford and Byron, plus the dilution of waste due to additional water entering the river, and the river's capacity to cleanse itself.

TABLE 12

WATER QUALITY PROFILE

	1971	1972	1973	1974	1975	1976
KISHWAUKEE RIVER NORTH BRANCH PERRYVILLE ROAD-EAST	NO DATA	B	A	A	B	B
SOUTH BRANCH PERRYVILLE ROAD-SOUTH	B	B	B	B	A	B
COMBINED NORTH AND SOUTH BRANCHES AT US 51	A	B	B	C	A	A
KILBUCK CREEK	A	B	B	B	B	B
PECATONICA RIVER WEST OF TRASK BRIDGE ROAD (RT. 70)	A	B	B	C	B	A
WEST OF TOWN OF HARRISON	A	B	B	C	B	A
SUGAR RIVER	NO DATA	B	B	C	B	B
ROCK RIVER ENTERING ILLINOIS FROM WISCONSIN	A	A	B	B	B	B
NORTH OF ILLINOIS RT. 2 NEAR ROCKTON	NO DATA	C	B	C	D	C
NORTH OF US 20 BYPASS (SOUTH OF ROCKFORD SANITARY DISTRICT)	B	C	B	C	C	C
NORTH OF TOWN OF BYRON (OGLE COUNTY)	NO DATA	B	A	B	B	B

LEGEND

A. GOOD
B. AVERAGE
C. SEMI-POLLUTED
D. POLLUTED

	STATUS	TREND
STREAM WATER QUALITY	AREA OF CONCERN MORE ACTION NEEDED	SLIGHTLY IMPROVING
DRINKING WATER QUALITY	SATISFACTORY	UNCHANGED

A second way to look at the data is to compare the rankings for all the stations of Winnebago County. The alphabetic rankings are determined by numerical computations of the number of pollutant violations. Comparing these aggregate figures for all the stations does not indicate a statistically valid trend; however, the average index value for the rivers of the county was better in 1976 compared with 1972.

The third indicator that shows the rivers of the county are improving is that while severe water pollution caused fish kills in segments of the Rock River in the 1960's, there were none of this magnitude in the 1970's. Consequently, the Department of Conservation is again stocking the Rock River and its tributaries with fish, including bass, and they are surviving.

The Illinois Water Quality Index is based on four of the most

important water quality parameters: dissolved oxygen, fecal coliform, total dissolved solids, and ammonia nitrogen. Dissolved oxygen is an indicator of the amount of oxygen in the water for fish or other aquatic plants and animals. Like humans, they need oxygen to survive. Large levels of certain pollutants reduce the amount of oxygen which in turn kills the plants and animals. Total dissolved solids indicate the amount of minerals in the water. This affects the water's taste and causes mineral buildup in pipes and appliances in industrial cooling water or water supplies. Winnebago County has natural "hard water" due to high levels of total dissolved solids. This standard considers only the additional minerals added to the rivers from waste water discharge. Fecal Coliform is one of the oldest standards in water quality evaluation and has been a prime public health indicator. Fecal coliform is a bacteria that lives in the intestines of mammals, including humans. Levels such as those in the county probably mean that untreated animal and human waste is entering the rivers. It is the repeated violations of fecal coliform content along with lead and copper that is holding down Winnebago County's Water Quality Index ratings. The last parameter is ammonia nitrogen. Ammonia as fertilizer is applied to agricultural fields. It also is produced in the breakdown of plant materials. However, the levels of ammonia nitrogen that violate water quality standard are probably not from natural sources, but from agriculture.

These components of the Water Quality Index are four of the twenty-two pollutants that the IEPA monitors. Table 13 indicates the standards that were violated in the county in 1975.

TABLE 13

WATER QUALITY VIOLATIONS IN 1975

LOCATIONS	FECAL COLIFORM	COPPER	LEAD	AMMONIA NITROGEN	TOTAL IRON
KISHWAUKEE RIVER	X	X	X		
KILBUCK CREEK	X	X	X		
PECATONICA RIVER	X	X			
SUGAR RIVER	X	X			X
ROCK RIVER	X	X	X	X	

It is difficult for the IEPA to keep up with all the new chemicals that are being put into the streams and to know their public health effects. For this reason, the federal government passed the Toxic Substances Control Act to determine through testing new chemicals those which should not be produced to protect public health and welfare.

The following indicates public expenditures within Winnebago County for water pollution control over the last 10 years and is primarily responsible for the improvements. While the typical image of a polluter is an industry, this was not the case in Winnebago County in the late 1970's because almost all industry and residences located within the service areas of a sanitary district were connected to treatment plants. It is actually the treatment plants that are the primary potential direct sources of pollution in the county. However, the effluent from industry can severely affect the quality of treatment as when large slugs of cyanide are put out by industry that knock out part of the sewage treatment process. To combat this the Rockford Sanitary District has an Industrial Sewer Use Ordinance which sets limits on the concentrations of waste that they will accept. Over the last ten years, the Cherry Valley Sanitary District has invested, or plans to invest by 1980, $300,000 in its treatment facilities. Durand

plans $750,000; Rockton, $300,000; Roscoe, $1.2 million; Seward, $200,000; South Beloit, $1 million; Winnebago, $200,000; and Rockford $62.2 million.

At the end of 1976 the status of the sanitary districts was quite different than 1972. Cherry Valley completed expansion of its plant in late 1976. Rockton's expansion work has made its plant adequate. South Beloit has problems with its system, but it's being studied. It has a sewer ban that prohibits extension until problems are resolved. Durand is completing a new plant. Pecatonica's plant is adequate, but has some operating problems. Seward needs to upgrade its system because it is on a low flow stream and must achieve a high level of treatment before waste can be released. The Rockford Sanitary District has made numerous improvements, such as extending a filtering system to improve the quality of effluent and has greatly expanded its surveillance of industrial flow to the plant to enforce the Industrial Sewer Use Ordinance. Approximately 55% of the waste flow coming to the Rockford Sanitary District is from industry with the other 45% from residential sources. During 1976-77, the Rockford Sanitary District stopped burning its sludge (solid material which settles out during the treatment process) because the incinerator emission was in violation of air quality standards.

Unfortunately, it is still not enough. A 1975 study by the IEPA indicated that after all the industry and sanitary districts point sources are operating under permitted levels, general stream quality standards will not be met, and all violations shown in Table 13 will remain.

Those pollutants shown in Table 13 that prevent streams from meeting water quality standards come from non-point sources, including urban storm water and agriculture. The latter is subdivided into ferti-

lizer, pesticide, soil erosion, livestock waste, forestry and fruit production. Urban storm water is one way that pollutants in the urban area enter our streams. Soil erosion provides a great volume of sediment, and the fertilizer and pesticide that enters the rivers is attached to loose soil particles. Livestock waste is a source which depletes the oxygen in the water and raises the fecal coliform count.

Another non-point source is the 20% of the population of Winnebago County not connected to sanitary treatment plants, but which utilize subsurface treatment, primarily septic tanks. Where there is low population and the soils have an adequate treating capacity, a well-designed and maintained septic tank is a good way to handle residential wastes. However, a new soil survey for Winnebago County indicates that 37% of the county is unsuitable for septic tanks. Consequently, some non-point stream pollution is from septic tanks on unsuitable soils or which have not been adequately maintained and overflow untreated waste into rivers.

From 1962 to mid-1976, the County Health Department had regulatory authority over septic tanks through a permit program which required a percolation test. In mid-1976, they revised their regulations to comply with a 1974 state law establishing minimum state-wide septic tank standards. The new WCHD regulations are better than the state standards and represented an innovation in technique by requiring soil borings and an analysis of the soils of the site by the Soil and Water Conservation District. Also, the Health Department inspects all new and repaired septic systems. Failures of existing systems are caught by WCHD surveys of potential problem areas, housing inspectors and citizen complaints.

As the Water Quality Profile, Table 12, indicates, the status of the rivers and streams is an area of concern and requires more effort

because there remain violations of several water quality standards. The trend is not certain; however, because the numerical Water Quality Index average for 1976 is higher than 1972, and there were significantly fewer and less destructive fish kills over the period, a slight improvement is shown in the Water Quality Profile.

Drinking Water Quality

In Winnebago County, water supplies are obtained from underground sources as discussed in the Water Resources section. Water is obtained from the sand and gravel deposits in the Rock River Valley and deeper limestone and sandstone deposits. As rainfall percolates through the earth, it is filtered by sand, gravel and clays, to the deeper deposits of sand and gravel, limestone or sandstone. Because groundwater is an invaluable resource, it must be protected from environmental pollutants.

The IEPA and the Illinois Department of Public Health have programs to regulate and protect water supplies, the former dealing with public water supplies, and the latter with the private ones. Homeowner's wells have to be approved by the Winnebago County Health Department to assure that they were properly constructed and not polluted by surface runoff or septic systems. Municipalities, governmental institutions, and subdivisions with ten or more lots are regulated by the IEPA. In 1976, the federal government expanded its authority to protect drinking water because many regions of the country are not as fortunate as Winnebago County and have severe quality problems. These regulations will be administered by the USEPA until the state decides whether or not to take over the program. While most of the rainfall that filters to the wells falls in Winnebago County, some of it originates in Wisconsin. If deep wells were ever polluted, it would be an interstate problem that the

federal government would have the best chance of solving. The federal legislation establishes nationwide minimum standards for drinking water quality. These federal standards are not a problem for Winnebago County since the drinking water already meets or exceeds them.

An area of special concern is the placement of landfills. The IEPA has a Land Pollution Control Division that regulates the construction and location of landfills within the state. For example, the landfill in which the City of Rockford disposes its solid waste is a former sand and gravel pit. Because rainwater filters through sand and gravel easily, this landfill was required to have a bottom layer of asphalt with a drain to collect pollutants leaching through the landfill to prevent them from entering ground water. This is the reason the IEPA requires landfills to have a local well monitoring program to insure that they are not polluting the drinking water resource.

From 1972-76 the drinking water supplies maintained their high quality and have a satisfactory status with unchanging trend as indicated in the Water Quality Profile, Table 12.

WATER RESOURCES

Of vital importance to the county is water. As the recent droughts in California have shown, it is a multiple-purpose resource used for human and animal consumption, varied household uses, including sanitation and sewage, industrial processing, and irrigation.

The sources of water are linked to the area's geological history discussed in the mineral resources section. Winnebago County relies on underground sources. There is sufficient underground water here to meet human need, and it is unnecessary to build dams and reservoirs as in many central Illinois communities. This reduces local problems with pollution since surface water is more susceptible than groundwater.

About 41 percent of the water supply produced in Winnebago County in 1970 came from wells drilled into sand and gravel deposits in the

ancient river valleys. Most of these wells, which are from about 100 to 300 feet deep, were in the Rock River Valley. In other parts of the county, most groundwater sources for individual domestic supplies are from shallow wells drilled in limestone. These wells which usually are about 100 feet deep represent about five percent of the total pumpage in the county.

The largest source of groundwater is deep sandstone wells. Sandstone deposits are deeper than limestone and represented 54 percent of the groundwater pumped in 1970. These range from 700 to 1,600 feet, although the City of Rockford has drilled one 2,000 feet.

Public bodies, which include the various water departments, utilize 76 percent of the county's water. The City of Rockford is 66% of the total. Seventeen percent is used by industry and the remaining 7 percent by individual residences with their own wells.

Although it is very difficult to estimate the amount of available groundwater in the county, the Illinois Department of Business and Economic Development has said the volume of recoverable groundwater is approximately 100,000,000 gallons per day. Consequently, Winnebago County is in a satisfactory status as shown in the Water Resource Profile, Table 14, for the forseeable future, since it is utilizing only 50 percent of the projected water resource.

County-wide water usage between 1960 and 1970 increased from 35 million gallons to 51.7 million gallons per day, an increase of 48 percent. The amount has remained fairly constant since then. However, there was enough cyclicality that there was no statistically valid trend as shown on the Profile.

TABLE 14

WATER RESOURCE PROFILE

	STATUS	TREND
WATER RESOURCES	SATISFACTORY	NO VALID TREND

WILDLIFE

It is easy to forget humans are members of the animal kingdom. Our development has allowed us to proliferate and dominate other animal species. With that domination rests some responsibility. Although we have greatly altered the natural ecosystem, the modified ecosystem still relies on many members of the animal kingdom. Gardeners know the value of having worms for nourishing the soil; orchard owners depend on bees to pollinate their blossoms in the spring; and in the summertime, anyone

watching the chimney swifts, tree swallows, and bats eating mosquitoes and other insects over the waterways should be thankful. Consequently, in many small and great ways, there is much to be thankful for from the other members of the animal kingdom. This section focuses on fur-bearing, game and non-game animals and fish.

The numbers and types of wildlife were considerably different before European settlement. Many mammals and birds have disappeared from Winnebago County. The now extinct passenger pigeon once was found by the thousands. Most large mammals have been totally eliminated in the county - the buffalo, black bear, bobcat, elk, timber wolf, and mountain lion were all residents of the county. The prairie chicken, the red shoulder hawk, and wild turkey have all been lost. Four mammals that disappeared from the county in the 1800's but were reintroduced or have recovered with protective management are the white tail deer, beaver, badger and coyote. Today many of the most numerous birds and mammals in the county, especially those that are pests, were not found here before settlement - the Norway rat, house mouse, starlings, pigeons, and house sparrow.

In the language of wildlife biologists, the key factor in numbers and diversity of wildlife is habitat. Without a diversity of homes and food, animals will either reduce their numbers or disappear. By the 1890's, the county was almost wholly converted from prairie and forest to agriculture. These changes, combined with overhunting and trapping were the cause of the great decline of wildlife diversity and quantity. Since there is no likelihood that Winnebago County's agricultural land will revert to its natural state, the optimum goal of maintaining and enhancing the current wildlife population must be accomplished by increasing the diversity and number of animals on the agricultural land

and providing open space for wildlife refuges.

The Wildlife Profile, Table 15, indicates the current situation. Deer and mourning doves are the only animals whose population is in a satisfactory condition. The trend for deer is stable while for mourning doves it is down slightly. The other game species all are declining -- woodcock, cottontail rabbit, pheasant, partridge, and grey and fox squirrels are decreasing in numbers. Only the wood duck has increased because, like the bluebird, it has been significantly helped by artificial houses to replace dead trees naturally used for their nests.

Overall wildlife habitat and management by private citizens and government agencies is an area of concern which requires more effort and its trend is slightly worsening. A major reason for the loss of habitat is that the increase in land values, crop prices, and taxes has put pressure upon land owners to put land into row crop production, thereby reducing the land formerly available for wildlife.

Hunting is a popular pastime within Winnebago County. Each year from 1972-76, between 10,900 and 12,700 citizens of the county purchased small game hunting licenses. The numbers increased and then decreased ending the five year period down slightly, and they are down considerably from their 1956 peak of 14,000. These individuals participate for recreation, a chance to get outside, and to provide an extra food source. In the past hunters worked with the federal government to establish taxes on hunting equipment to fund wildlife management programs throughout the country. Consequently, the knowledge available on animals is focused on game species. In recent years there have been efforts to balance this by considering all animals rather than just game. The Department of Conservation, for example, has hired a non-game biologist.

The prime organization working to foster wildlife in Winnebago County is the Illinois Department of Conservation (DOC). It has programs designed to maintain and improve the situation for wildlife in Winnebago County. Although not a new concept, in 1975 it instituted "Acres for Wildlife" which has a one-year registration for land one acre or more in rural areas to maintain and improve existing habitat by providing more shelter or food. In 1975 in Winnebago County, 83 acres were added to the program and in 1976 another 351 acres. Hopefully, this increasing trend will continue.

The DOC has a Wildlife Biologist in Ogle County whose area includes Winnebago County. He is available to provide free technical assistance to a landowner to develop a plan to maintain and improve wildlife conditions. In addition, through the state nursery, seeds and trees are provided at nominal cost to implement these wildlife habitat plans. The Soil Conservation Service also includes wildlife management in the Conservation Plans it prepares for landowners and has many free publications on the subject. Landowners interested in assisting wildlife should contact the Wildlife Biologist or the Soil and Water Conservation District.

The emphasis of the DOC Wildlife Biologist shifted during the years 1972-76. Prior to 1972, the emphasis was on physically helping landowners plant trees because at that time free trees were provided by DOC. A shift occurred in 1973-74 when the emphasis was placed on helping landowners improve shelter and food for wildlife by providing them with specific advice on the best actions to take to do this.

Songbirds are protected by international law from hunting. As stated in the Information Sources chapter there is no statistically valid information currently on population trends of songbirds. However,

as with other wildlife, they are very sensitive to the decline of habitat in the county so their status in the Wildlife Profile, Table 15, is categorized as an area of concern. Experts in the county have identified gross improvement in two species from 1972-1976. Bluebird populations have increased from quite a low level due to volunteer conservationists providing artificial houses to replace their natural homes in dead trees which are becoming ever more scarce in the county. Baltimore orioles, which like the bluebird were historically more plentiful and then declined, are also on the upswing. The oriole was very sensitive to the insecticide DDT. As it was banned for use, the orioles are steadily increasing their numbers again.

Rare and endangered animals are another indicator of wildlife's status in Winnebago County. The concern to preserve rare and endangered species has been strong within the scientific and conservation community for many years. This concern began to be shared by the general public and government in the early 1960's. At that time, the rapid loss of species throughout the world caused the United States to join with other nations in prohibiting the importation of furs and other products of endangered species. In the late 1960's, this legislation was expanded to include American animals and in 1972, plants. Also in 1972, the State of Illinois created the Endangered Species Protection Board to license the sale and ownership of internationally endangered animals. From 1972 to 1976, information on animals which were endangered or being eliminated from Illinois was developed by the Illinois Nature Preserve Commission in conjunction with the Department of Conservation. There are no yearly data on the status of these rare and endangered species, but county residents should be aware of animals that need protection,

hence their ranking as a serious problem on Table 15.

Two state endangered birds, the red-shouldered hawk and cooper's hawk, no longer nest within Winnebago County. As recently as eight years ago, both were residents of the county. The cooper's hawk habitat was dense mature upland woods which because of housing developments and cutting are now scarce. The red-shouldered hawk nested in forest adjacent to rivers. Two other threatened birds which are not quite in the perilous situation of the endangered species, are the veery and the henslow's sparrow. The veery occupies bottomland forests along streams, while the henslow's sparrow requires a diversity of habitat that includes prairies and old fields. Both are found in the Sugar River Valley.

There are two rare amphibians: the blue spotted salamander, found in small ponds in the Sugar and Pecatonica River valleys and the pickerel frog, an inhabitant of ponds and sluggish streams. There is one rare fish, the western sand darter, found in the Sugar River which requires clear sandy bottoms and is very susceptible to pollution. The rare status means that they should be watched carefully because they have a low population, but are not yet threatened or endangered. There is one reptile in the rare category, the Blanding's turtle, found in wet marshes and prairies.

When the State Endangered Species Protection Board establishes the list of these rare, threatened, and endangered species, it is hoped private citizens and public officials will act responsibly in making land-use decisions to preserve these species so that they can survive both in Winnebago County and the state.

In looking at furbearing animals and their trapping, economics is much more important than with game animals. Furbearing animals are muskrat, mink, beaver, red and gray fox, and raccoon. Raccoon and the foxes are both game and furbearing animals. Primarily, people interested in trapping are concerned with making money rather than recreation or obtaining food. Consequently, there is a correlation between the number of trappers, the size of harvest, and the price of the furs. Currently, high quality raccoon coats cost in the neighborhood of $1,700 to $2,400. This explains why so many raccoons were trapped in 1976 and the wide variability in the numbers of trapping licenses in Winnebago County. In 1951 there were 81 licenses; 1952, 137; 1953, 159; 154, 114; and 1955, 101. This gradually decreased to 46 in 1959. It then stabilized in the early 1960's with a high of 95 and an average of about 80. In 1971, there were 66 licenses; 1972, 100; 1973, 177; 1974, 266; 1975, 234; and in 1976, 212 - a tripling in the number of trappers. All we can assume from this information is that the furbearing animal populations within Winnebago County are reasonably healthy, at least for the short term, or trappers would not buy licenses. Future sales could tell a different story though.

Fishing is a very popular activity within Winnebago County. On a nice summer's day, it's unusual to drive near a stream without seeing fishermen. There has been a significant increase in the number of Winnebago County residents purchasing fishing licenses. From 1972 to 1976, they increased from 16,600 to 22,800. During the same period, power and non-power boat licenses within the county increased from 5,700 to 7,100. This is a 25% increase in boating licenses and a 37% increase in fishing licenses.

In addition to the enjoyment and food derived from fishing, fish are good indicators of water pollution and the quality of our streams. As with wildlife, habitat is extremely important for fish and they also are losing many of their former breeding areas. The county is not covered with lakes as Wisconsin and Minnesota are. Of the few ponds and lakes here, 59% are manmade. Consequently, streams are the major habitat for fish. Lost habitat is due to channelization of streams and filling of wetland areas. The Wildlife Profile, Table 15, for fish indicates that channelization and the filling of wetlands along streams are areas of concern with no valid trend but still continued destruction. The one indicator that is not an area of concern is fish kills which is in a satisfactory condition and has improved over the study period.

In the years since 1972, 16.7 miles or 6% of Winnebago County streams were channelized. These included parts of Grove, Kent, Otter, and Raccoon Creeks, and the Sugar River. In addition, another eight miles of stream, including Kent and Kelly Creeks are proposed for channelization. Since 1973, 25 miles of both Kilbuck Creek and the Kishwaukee River have been channelized in McHenry, Ogle and DeKalb Counties with an additional three miles proposed. This channelization harms the fisheries in Winnebago County also. Water flow is increased due to the ditching which increases the sediment levels and the erosion of the streambanks. Scouring the river bottoms and increased sediment raises the concentrations of both nutrients and toxic metals which are harmful to fish. Vegetation is removed from streambanks which removes shade causing water temperature increases. This decreases the oxygen content of the water which hurts both plant and animal life. Channelization turns interesting, productive streams into boring, monotonous ditches.

The filling of wetlands occurs independently, as well as with stream channelization. This means the filling of marshes, swamps, slough or backwater areas by bringing in sand, rock, gravel fill and construction debris to raise the land surface above the water table. This destroys wetland's important role for fish of providing breeding and feeding habitat. Wetlands also provide natural filtering of the water, storage for floods, nesting and wintering grounds for water fowl, breeding grounds for frogs, toads, salamanders and ducks, and recharge for our underground drinking water supplies. Federal government statistics indicate that Illinois has lost 88% of its wetlands since 1850. The best estimates for Winnebago County for the twenty year period of 1955-75 indicate a wetland loss of 67%.

The value of wetlands has now been recognized by federal and state governments. In the 1972 amendments to the Federal Water Pollution Control Act, negative impacts of channelizing, filling, and dredging streams and filling wetlands were recognized. The Army Corps of Engineers was empowered to establish permit programs to limit these activities. The permit program, which exempts normal farming activities, is currently being implemented by the Corps of Engineers. The Rock River was included under the program in July of 1975. The second phase which included the Kishwaukee, Pecatonica, and Sugar Rivers, started in July of 1976. In July of 1977, the program included all the smaller year-round streams. There were six permits granted in the county in 1975 and eight in 1976. This program, operated in cooperation with the DOC, should help to preserve much of the remaining scarce wetlands.

There is no annual monitoring of fish populations in any waterways in Winnebago County. A major survey was taken in 1977 and may be repeated within five years.

Fish kills, as indicated in the Wildlife Profile, Table 15, are in a satisfactory condition with an improving trend. There were three small fish kills over the period of 1972-76. One was an oil spill in Kent Creek, the second was illegal cyanide dumping in a sewer to the Rock River, and the third was a truck accident on U.S. 51 bridge over Kilbuck Creek involving phosphoric acid. These levels are much less than the ten-year period from 1960-70, when there were eleven fish kills in the county with over 369,000 fish killed. Over that period, five fish kills occurred below the Rockford Sanitary District, while from 1972-76, there were none.

The DOC has a Fisheries Biologist who covers Winnebago, Stephenson, and Boone Counties. In the 1960's and early 1970's, his time was spent working with owners of ponds and lakes because the water quality of streams and fish populations in them were so low. Also, the Federal Agricultural Stabilization and Conservation Service and the state were providing funds for building ponds and lakes during that period. Pierce Lake in Rock Cut State Park is an example of a state financed lake. However, in the 1970's the focus shifted back to streams and rivers as water quality improved and with changes in department leadership which is appropriate since surveys of fishermen indicate that the Rock River is the No. 1 fishing resource in Winnebago County. The Fisheries Biologist believes stream fish populations are improving in the county.

The Rock River is now capable of being stocked with walleye, sauger, muskie and striped bass, but funds are unavailable. The Rock River is now supporting populations of northern pike, walleye, and small-mouth bass. The clean, cold water habitat and public ownership found on much of Kent Creek enables the Department of Conservation to stock it with Rainbow Trout periodically. There was commercial fishing conducted on the Rock River over the period of 1972-76, but there is no trend from the data. Both the Pecatonica and Rock Rivers had harvests of 110,000 pounds per year of commercial fish, predominantly buffalo or carp suckers, during this period.

To protect our wildlife and fish resources within Winnebago County, the DOC has a Conservation Officer with law enforcement responsibility. Historically, the local officer worked only in Winnebago County. However, during 1972-76, the Boone County officer retired, and the DeKalb County officer was transferred to McHenry County so the Winnebago officer is having to cover Boone and DeKalb Counties too. His responsibilities, in addition to protection of fish, wildlife, and state park land, include enforcing boating, snowmobile, and off-road vehicle laws. The Winnebago County Council of Sportsmens Club feels that because of the population of Winnebago County, one officer spread between three counties is not enough and has requested that the Department of Conservation establish two full time officers for Winnebago County. The Winnebago County Council of Sportsmens Club feels that many people are taking more than the maximum limit and hunting when the season is legally closed.

Enforcement also has been hampered by the court system, which was lenient in penalizing people caught breaking fish and wildlife laws. That has changed in Winnebago County, and the current judges seem to realize the importance of protecting fish and wildlife. Hunting and fishing seasons are established to protect the reproduction cycle of animals. Limits on the total number of animals that can be taken are based on estimates of reproductive success. The purpose of these limits is to preserve and maintain a perpetual and more stable wildlife population in the region. The individual limits per hunter or fisher are designed to equitably spread the harvest.

In this urbanized county, the Conservation Officer is involved in many types of activities, including dog and cat problems, and wild animals trapped in houses. While he is fulfilling a need, these activities prevent him from protecting the more important fish and wildlife. The status of conservation enforcement shown on Table 15 is a serious problem, and it is slightly worsening.

TABLE 15

WILDLIFE PROFILE

	STATUS	TREND
GAME SPECIES DEER	SATISFACTORY	UNCHANGED
WOODCOCK	AREA OF CONCERN/MORE ACTION NEEDED	SLIGHTLY WORSENING
COTTONTAIL RABBIT	AREA OF CONCERN/MORE ACTION NEEDED	SLIGHTLY WORSENING
PHEASANT	AREA OF CONCERN/MORE ACTION NEEDED	SLIGHTLY WORSENING
PARTRIDGE	AREA OF CONCERN/MORE ACTION NEEDED	SLIGHTLY WORSENING
MOURNING DOVE	SATISFACTORY	SLIGHTLY WORSENING
WOOD DUCK	AREA OF CONCERN/MORE ACTION NEEDED	IMPROVING
GREY AND FOX SQUIRRELS	AREA OF CONCERN/MORE ACTION NEEDED	SLIGHTLY WORSENING
WILDLIFE HABITAT AND MANAGEMENT	AREA OF CONCERN/MORE ACTION NEEDED	SLIGHTLY WORSENING
NON-GAME SPECIES RARE AND ENDANGERED ANIMALS	SERIOUS PROBLEM	WORSENING
SONG BIRDS	AREA OF CONCERN/MORE ACTION NEEDED	NO DATA
FUR BEARING SPECIES	AREA OF CONCERN/MORE ACTION NEEDED	NO DATA

FISH PROBLEMS

CHANNELIZATION OF STREAMS	AREA OF CONCERN/MORE ACTION NEEDED	NO VALID TREND
WETLANDS FILLING	AREA OF CONCERN/MORE ACTION NEEDED	NO VALID TREND
FISH KILLS	SATISFACTORY	IMPROVING
FISH SPECIES POPULATIONS	AREA OF CONCERN/MORE ACTION NEEDED	IMPROVING

WILDLIFE AND FISH CONSERVATION ENFORCEMENT	SERIOUS PROBLEM	SLIGHTLY WORSENING

INFORMATION SOURCES

This report brings together the information governmental agencies use in their decision-making to protect and improve the environment.

The information available in the categories varied widely. Much information on Air Quality was available from the IEPA's federally supported monitoring program. It also provided the 1975 county projections of the sources and quantities of pollutants. A weak spot was the lack of specific information on the individual contributors to air pollution, and what they have done to improve air quality.

The Energy Conservation section benefited from the information available from Commonwealth Edison and Northern Illinois Gas, although natural gas and electrical generation comprise only 36% of the state's energy use. Information on the use of petroleum products, which provide 39% of the state's energy, and include gasoline and heating oil, was unavailable on a county basis, and even the Division of Energy of the Department of Business and Economic Development which provided the state data has difficulty obtaining reliable figures due to the large number of sales outlets. While there is no centralized source of information on solar energy applications, data was obtained by surveying local dealers, suppliers and installers. There is also no local source of information on coal usage in the county. While there are two dealers who service smaller users, all the large users deal directly with the producers so their usage is unknown.

The Forest and Prairie information came from three sources. The data on acres in forest came from the five-year frequency Census of

Agriculture of the United States Census Bureau, covering 1969 to 1974. The second source for the status of the woods is the same ten-year-old survey used in the Soil Conservation section. The third source was the regional Department of Conservation forester.

The information on rare and endangered plant species came from two sources. Historical information came from Dr. Egbert Fell's Flora of Winnebago County. Current information on the status and trends came from the Natural Land Institute which is researching the endangered plants and animals in Illinois on a grant from the Joyce Foundation of Chicago. There are no periodic surveys of urban trees in the county. One survey was completed in Rockford almost twenty years ago during the ravage of the Dutch Elm disease, but only on city land. The status and trends were provided by the Department of Conservation and Rockford foresters.

The historical population figures in the Living Space section came from the state Bureau of the Budget based on federal Census Bureau figures and birth and death statistics from the county health department. Estimates of future population came from the City/ County Planning Commission. There is a disturbing discrepancy in the figures on the loss of agricultural land to urbanization. Information from township assessor's records showed a loss during the study period, 1972-1976, of 5,000 acres per year while the federal Census of Agriculture indicated a loss of 3,000 acres. The Living Space Profile used the lower figure which is still large. The County Board, which routinely approves changes in zoning from agriculture to residential, should have

better figures than these that vary by 66%. The figures showing the vastly disproportionate urban and residential development of the northeast portion of the county are based on reports produced annually by the City/County Planning Commission. Usage figures for open space land were unavailable except for a few special uses, such as golf courses and tennis courts, where fees are charged, but not for parks. Data on holdings of the open space agencies came from the Forest Preserve District, Rockford Park District, and the 1973 Park and Open Space Policy Plan of the City/County Planning Commission.

The Illinois Geological Survey collects Mineral Resource information county by county and publishes it if there is a sufficient number of mining operations as in Winnebago County so that proprietary information is not released. Information on the location of mineral deposits also is good, but it lacks an estimate of reserves.

There are no data on Noise Quality in Winnebago County. State regulations are based on noise crossing property lines and are limited to specific sites where citizens have complained. Such major sources as road, airport, and construction noise, are not regulated or monitored, so the status and trends were a combination of federal and state estimates of the problem.

The information on Radiation is a composite of local information such as natural and nuclear power levels, supplied by the Illinois Department of Public Health and national averages on global fall-out and consumer product exposures from the USEPA. When the Byron Nuclear Power Plant becomes operational, the Department of Public Health will have

much more data. There is no information available on the trends of high level radioactive waste shipments through the county because it appears that no organization is keeping track of it.

Objective data on Soil Conservation are sorely lacking. The available information is the ten year old Conservation Needs Inventory by the Soil Conservation Service and many changes have occurred in agricultural practices. A new survey is being started, but ten years is too long between surveys for this critical problem. Neither the federal government nor our county Soil and Water Conservation District has good information to work with in their decision making. The Soil and Water Conservation District works hard to help individual landowners, but shortages of staff prevent it from determining whether conservation measures have been implemented and maintained. Estimates by the Soil Conservationist were used on the trends and status of the problem. The District's records and a survey of local implement dealers provided data on solutions. Cost information on the best soil conservation management was provided by the IEPA.

There is little information on Solid Waste in the county. The only figures come from the Rockford Department of Public Works because it has a centralized pickup and landfill operation. In the remainder of the county, individuals contract with numerous independent haulers to handle their waste. Consequently, this section utilizes the City of Rockford's data, and estimates developed in a 1975 study for the Winnebago County Board.

The IEPA has a monitoring program for Water Quality on the Kishwaukee, Pecatonica, Rock, and Sugar Rivers, and Kilbuck Creek. Combined with its unique Water Quality Index, stream quality information is among the most detailed Profile. However, information on specific public and private sources was unavailable in a succinct form. The specific treatment plant status and financial information also came from the IEPA. While the IEPA is computerizing its records to facilitate the collection and analysis of program activities, drinking water quality information for the county is still in numerous pages of laboratory results and reports, and not in summary form. Spotchecks of records and statements by local IEPA officials provided the status and trends.

Good figures are available from the State Water Survey on the usage of Water Resources in the county. While it does not estimate potential supplies, the Rock Valley Metropolitan Council uses the state Department of Business and Economic Development estimate.

Specific information on Wildlife was disappointing. The State Department of Conservation surveys several game species every year in the county, but the survey is too brief and infrequent to be statistically valid for less than regional or state-wide trends. Since 1971, the United States Fish and Wildlife Service has been conducting a national survey of nesting songbirds in which Winnebago County has been included. Using a statistical approach, surveys are run simultaneously throughout the country to determine the number and variety of birds because changes in bird populations are good indicators of many environmental changes - especially the increase or decrease of chemicals, such

as pesticides. Unfortunately, the survey was designed to collect information for meaningful nationwide totals. The data from Winnebago County will not be statistically valid for another ten years when there will be fifteen years of historical records available. The status and trends of specific game animals were estimated from the experience of the Department of Conservation Wildlife Biologist. Countywide information on furbearing animals is more scarce than that for game species. The Department of Conservation, in order to rectify the information problem, has a Furbearing Animal Biologist. The historical information is not on a countywide basis. The biologist intends to obtain county data. Trappers in the county now are required to submit information, but many don't and there is no method to determine whether the information that is received is accurate. The Department of Conservation uses statewide and regional data to determine the status of the furbearing animal population. As an indication, in the 1930's between 30,000 and 40,000 raccoons were trapped each year, whereas in 1976 there were between 175,000 to 300,000 trapped. In this case the increase in trapping is because of a long-term period of a healthy and expanding raccoon population. Rare and endangered animals information came from the Natural Land Institute research project for the Joyce Foundation. Fish populations are not routinely recorded. Consequently, status and trends were developed with the Department of Conservation Fisheries Biologist. Wetlands filling and draining and stream channelization also have not been surveyed routinely in the past. The Fisheries division of the Department of Conservation did publish data on the wetlands filling

and stream channelization of the county during the study period. The Corps of Engineers under the Federal Water Pollution Control Act should obtain better information.

* * *

We conclude that while federal, state, and local agencies and private groups have generally invested heavily in management programs, they have not adequately collected and analyzed indicators of change in Environmental Quality. These indicators would allow analysis of the successes and failures of programs, encourage cessation of unproductive activities, and encourage attempts at more effective programs.

CONCLUSIONS AND RECOMMENDATIONS

Winnebago County entered the study period of 1972 with some problem areas, but had a relatively good level of Environmental Quality. By 1976, the quality was still good, but lower. The improvements in air and water quality; natural gas and electrical energy conservation; solar energy use; and fish populations were outweighed by the increasing rate of urbanization of the county; declines of agricultural and woodland acreage; increased noise pollution; deteriorated populations of wildlife and rare and endangered plants and animals; and increased soil loss. However, these overall declines in Environmental Quality can be stopped - and reversed.

Air Quality

The air quality in Winnebago County is fair to good, but still needs additional effort to consistently meet Illinois minimum standards. The two major pollutants on the basis of number and seriousness of violations are photochemical oxidants (ozone) and particulate matter (haze). The solution to photochemical oxidant (ozone) pollution is to reduce motor vehicle emissions. The federal government is reducing these emissions by limiting pollutants emitted by new cars and making those standards more strict in the future. As owners of new cars unfortunately know, some manufacturers have installed devices that are more troublesome than others. It will be several years before a large percentage of cars have lower emission levels and air quality improves. In the meantime, individuals should eliminate unnecessary driving; maintain the pollution control devices on their vehicles; and walk,

bicycle, or use public transportation when possible. This is especially important during the summer months. Public officials should support and encourage the use of public transit as well.

The most efficient approach to control particulate matter is to focus on the 50% of the pollution that results from wind erosion from construction sites. All governments in the county should pass ordinances requiring temporary land treatment techniques at construction sites developed cooperatively with the Soil and Water Conservation District.

Energy Conservation

There is still a long way to go in the amount of energy that can be feasibly saved. Helpful information can be obtained from the Division of Energy of the Department of Business and Economic Development in Springfield. While the department has no regional staff, it does have many free do-it-yourself and informative publications. This is useful to people who have homes, farms or commercial, office or industrial buildings who want to make their structures more energy efficient. Information also is available on constructing new energy efficient facilities.

The department also has practical information on the potential of solar energy in Illinois. Many people feel there isn't enough sunlight during the winter to be utilized in northern Illinois. However, the Division of Energy estimates that a well-insulated house could have 50-75% of its heat and domestic hot water provided by solar panels. Research indicates that for new homes in the Winnebago County area the

most economic fuel system in the county is natural gas. However, as a nonrenewable source, that will not continue. Over the short term, electric heat pumps are the second most economic for new installation. Those users who are considering fuel oil would find that solar is more economical now than fuel oil furnaces.

The economics for domestic hot water heat are very favorable and the Division of Energy is developing figures for northern Illinois. Additional state studies are being made of agricultural uses of solar energy. Preliminary indications are that there may be even more economical uses for solar energy in agriculture than for residential or industrial uses. Solar use in animal shelters and grain drying operations can provide 50% of the necessary energy. It is impossible to generalize about the economics of adding solar heat to older homes because each home is different. However, the Division of Energy can supply those homeowners, industries, or agricultural users with names of experts who can help them determine the possibilities. There are other activities that we can take to save energy - keep thermostats a little lower in winter and higher in summer; purchase energy saving appliances and vehicles; insulate the existing buildings; drive our vehicles less; car pool and use public transportation; and plant and nurture trees on the east, south and west sides of the buildings for shade.

Forest and Prairie

Since Winnebago County has a small percentage of rural forest land now and should retain it, the County Board should consider this problem. If the tax situation could be improved following states like Wisconsin

there would be more incentive for woodland owners to improve timber production. This is good public tax policy because most of the forest land left in the county is on soils or in flood plains which are not suitable for agricultural production. If the annual tax situation was improved, forest owners could perform good forestry management practices and increase their income which would provide equal or greater tax revenue for the county.

The City of Rockford should conduct an inventory of the status of its urban forest. Then it should fund a consistent tree planting program with a large variety of tree species to avoid the repitition of the elm disaster on public land in areas of need. It should also target the distribution of the free trees of many varieties funded by the newspaper recycling profits to those privately owned areas of need. Lastly, it should establish an educational campaign for landowners concerning the proper treatment of their existing trees to control disease. Other incorporated and unincorporated areas of the county should take parallel steps.

For rare and endangered plants, notification and education of private owners should be implemented. Then Winnebago County Forest Preserve District, as the only county-wide natural resource agency, should develop a combined public and private preservation program to insure their protection.

Living Space

A key starting point which has a domino effect is to actively manage urbanization of rural areas. The County Board should take two

actions. It should update its land-use plan based on resident preferences for future land use and stop authorizing variances to the plan. Also it should provide incentives to the citizens, or enact ordinances to solve specific environmental problems such as prime agricultural land preservation, floodplain protection, and provision of open space in new subdivisions. The incorporated communities should also review their land-use plans, taxes, and services to encourage growth in existing developed areas. Even though plans are made, it is not certain they will be implemented because major changes can and have been made in them by elected officials. When Winnebago County revised its plan in 1972, it intended to preserve the strong rural agricultural character of the county. However, the County Board repeatedly has made zoning changes from agricultural to residential and the rate of these changes is accelerating. Elected officials only will implement the plans if they know their constituents support them.

The current acreage of park and open space land is not the only consideration in evaluating the county's status. For economic and practical reasons, land acquisition by park and open space agencies should occur prior to development rather than after. The economic reasons can be seen in the tremendous growth in land prices. In Illinois, farm land prices during the period of 1972-76, increased 2.8 times. County taxpayers would be wiser to purchase park and open space now with bond funds that would be paid off in 20 to 30 years. In that way future generations could help pay for the land preserved for them. Secondly, there is only a limited amount of prime forest and recrea-

tional property in the county for acquisition. Unfortunately, this land is rapidly being developed for private use. Unless we move soon, the best lands will be gone and the county will have failed to preserve this limited resource.

While the county population declined from 1970-1976, most federal, state, and local officials believe it is temporary. They expect county population to increase by 30% by the end of the century. Even if there are smaller population increases, the urbanization of rural areas is occurring rapidly and additional forest preserves are necessary to provide open space and break up the residential spread. For the period of 1976-2000, there is a need for an additional 2,600 acres of forest preserve land. The Forest Preserve District should not stop with the "catch up" acquisitions of the 1970's, but should instigate a continuing land acquisition program that will stay ahead of urban development and not wait another forty years when land will be much more expensive.

As shown on the Living Space Profile, community park land will require 580 acres to provide adequately for citizens' needs between 1976 and 2000. Neighborhood parks over the same period will need 767 acres.

One possibility for easing the park districts' cost for preserving sufficient neighborhood park land is an ordinance which has been used successfully nationwide. The ordinance requires subdivision developers to provide neighborhood park land, or provide the local park district with funds to acquire and develop a nearby park. This is a sound technique and an extension of the current subdivision regulations that require developers to put in roads and sidewalks when developing rural

land.

Another method which has worked beneficially for both the Rockford Park District and the Forest Preserve District has been generous donations of land by landowners within the county or grants from the state or federal government to acquire land. Approximately one-third of the Rockford Park District land and one-fourth of Forest Preserve District land has been received through private donation or public grant. Consequently, it is hoped that all park and forest preserve districts will continue to work with prospective landowners concerning donations of land and with the Department of Conservation concerning financial assistance for land acquisition. For example, from 1972 to 1976, there were private donations of 19 and 15 acres for neighborhood parks to the Rockford Park District, and donations of 369 acres and 107 acres were given by private owners to the Forest Preserve District.

Mineral Resources

While there are ample sand, gravel, and limestone deposits in the county, there is no estimate of the remaining life of the resources. This should be rectified. Since the mineral extraction results in a permanent change in the land-use and negative environmental impacts, efforts should be made to conserve the resource. In addition, county land-use planning should manage surface development above the resource to insure adequate available supplies for the foreseeable future.

Noise Quality

Since noise pollution is getting worse, the IEPA either should make its citizen complaint program much more active and visible, or convert

to a permit-type control strategy if it is serious about reducing the noise problem. The status quo is clearly ineffective.

Radiation

County citizens and government officials should investigate the high radioactive waste shipments through the county and take any action necessary to insure public safety.

Soil Conservation

A combined local, state, and federal effort is needed to control wind and water soil loss. As one farmer said, "Soil conservation is a fad that has gone out of style." Farmers have lost interest and willingness to farm with the long-term good of farming and the county in mind. What is needed is to re-awaken the perpetual agriculture attitude among farmers. It is hoped that the IEPA working with landowners, the University of Illinois Extension Agent, and Soil and Water Conservation District personnel, can educate and assist farmers and other landowners in minimizing soil loss in Winnebago County.

Solid Waste

If solid waste is in a no-growth state, then it is an improvement in environmental quality because there will be less waste of nonrenewable resources, landfills will last longer and less land will be consumed for landfills. County and local governments should encourage citizens to reduce their waste and develop programs to reuse, recycle and recover energy from the waste rather than burying it. If the Rockford Sanitary District set higher pre-treatment standards for industry, the sludge could be used by farmers for fertilizer rather than

wasting it in a landfill at added expense because of its high toxic heavy metal concentrations.

Water Quality

A. Streams

The health department needs to insure that septic tanks are operating properly and not overflowing into the rivers. The sanitary districts need to work with the IEPA to get control over the non-point sources of pollution which are the major roadblocks to good river quality in the county.

B. Drinking Water

There are two areas in which to be vigilant. The first is to insure that landfills or other land waste disposal does not pollute drinking water, and, second, that public and private water suppliers maintain equipment and operations to comply with state and federal standards to insure that water is as clean and safe when it comes from the faucet as when it leaves the ground.

Water Resources

Since nearly half the water used in the county is for commercial and industrial purposes and is subject to business cycle fluctuations, future usage will have to be monitored to determine if the long term increasing per capita trend has been changed or if the recent leveling of use is temporary. If per capita consumption of water resources stays at the current level and population increases 30% by the end of the century as projected, water supply will not limit growth. Nevertheless, we should adopt water-saving methods to maintain quality water resources

beyond the turn of the century for future generations.

Wildlife

The ultimate future for wildlife, including rare and endangered species within the county, will not be determined by the activities of the Department of Conservation. It can only provide assistance to landowners. What is needed is the commitment of landowners to provide the proper habitat, both food and shelter, for wildlife on their property. A significant increase in quality or quantity of habitat will increase wildlife. However, continued growth of agricultural land values, urban sprawl, and increased crop prices, will decrease the available quantity in the future so the county needs more open space within parks and forest preserves to minimize these losses. However, much can be done to improve the quality of habitat in both urban and rural areas. The Wildlife Biologist can provide information on the best plantings to use to increase wildlife. In urban areas this primarily means encouraging birds, while in rural areas a greater number of species can be helped.

While the Wildlife Profile emphasized game species, reflecting the Department of Conservation's orientation, many people enjoy non-game wildlife. Much more emphasis should be placed on this state-wide. Paralleling the "Acres for Wildlife" in rural areas, the DOC should start a "Yards for Wildlife" to promote urban wildlife.

Unlike the situation for wildlife, the future looks bright for fish. The amount of wetlands destroyed and streams channelized should decline if the Corps of Engineers and Department of Conservation remain

diligent in their protection. Water quality in Winnebago, adjacent counties and Wisconsin should improve, further benefiting fish and other aquatic animals and plants.

The Department of Conservation should review and correct the conservation enforcement deficiencies, especially the spreading of the Conservation Officer over three counties.

* * *

With these and other efforts by individual citizens and governmental officials, the deterioration in Environmental Quality between 1972 and 1976 can be reversed and we can move toward excellence. In addition to the many health, welfare, and recreational benefits from these improvements mentioned in the text, a quality environment indirectly also helps maintain a healthy economy. Industry and the people who work in it prefer to stay and expand in an area if it is a good place to live, and Environmental Quality is an important part of the overall quality of life.